Open Network, Open Mind:

An examination of the causal relationship between network heterogeneity and open-mindedness

E. V. Ebenau

L. G. Stulen

Supervisor: V. C. Frey, MSc
Second reader: A. Knigge, MSc

This study aims to assess the relationship between network heterogeneity and open-mindedness, open-mindedness being the extent to which one tolerates diverging opinions or people with diverging opinions. Using data of the second and third wave of the Survey of the Social Networks of the Dutch (2007; 2011), this study will test the hypothesis that if the heterogeneity of some person's network is higher, the more open-minded this person will be. To establish causality, a distinction between discussion and colleague networks is made. The results demonstrate that network heterogeneity indeed has a positive relationship with the respondent's open-mindedness. Because of the distinction between discussion and colleague networks, we can establish that one's open-mindedness is indeed influenced by one's network, and not the other way around (e.g. open-minded people selecting a more varied and open network).

Keywords: open-mindedness; heterogeneity; personal networks; causality; discussion networks; colleague networks; OLS regression

Table of contents

Preface

This paper is written by Eef Ebenau and Lydia Stulen as a Sociology Bachelor Thesis at the University of Utrecht, supervised by Vincez Frey, PhD student at the department of sociology and the ICS research school.

Starting with a literature review, we examined previous research on the relationship between network heterogeneity and open-mindedness. Although this relationship was found by several researchers, the causality of this relationship could not really be determined in these previous researches. We accepted the challenge of addressing this problem. After numerous hours of recoding and merging the dataset, our results led us to conclude that the causality of this relationship could be established.

We would like to thank our supervisor, Vincenz Frey, for his time and advice. Writing this thesis has been a great learning experience. Beside finally bringing our acquired skills into practice, we also learned new aspects of doing sociological research. It was a very pleasant cooperation, both together as well as with our supervisor. In addition, we would like to thank some of our fellow students for critically reading our paper.

1. Introduction

The Netherlands has always presented itself as an open-minded country. Nowadays, with an upcoming anti-Islam movement and decreasing support for all sorts of minorities, it seems tolerance is diminishing. To bring different groups closer together, the Dutch government presents measures such as the 'Rotterdam law', which forces real estate corporations to mix people of different social statuses in the same neighbourhood[1]. It could be that having a network with a lot of different people indeed leads to more open-mindedness towards each other and therefore, these policies can have positive effects on Dutch society. This makes it interesting to study the relationship between network heterogeneity and open-mindedness.

Previous research shows that the way people think, relates to certain personal characteristics. For example, people became less open-minded towards other opinions when growing older (Ganzeboom & Flap, 1988) and higher educated people were found to be more open-minded than lower educated people (Jaspers, 2008). It is also known that the way people act and think relates to the people around them. It is argued that the social context in which individuals are embedded is likely to influence their personal beliefs and attitudes (Visser & Mirabile, 2004). Over the years, it has been extensively studied how personal characteristics of members of the personal network could influence one's way of thinking (e.g. Bienenstock, Bonacich, & Oliver, 1990; Burt, 2000; McPherson, Smith-Lovin, & Cook, 2001; Visser & Mirabile, 2004). However, one important limitation of these previous studies is that they did not account for the effect of changes in personal networks on the formation of attitudes. This study will examine the following research question: '*do changes in the heterogeneity of the respondent's personal network – consisting of friends, neighbours, colleagues and family - cause changes in the open-mindedness of the respondent?*'

Social scientists have examined the relation between different properties of personal networks and open-mindedness in the past. As for the composition of a network, Granovetter (1973) argues that individuals in a homogeneous network tend to have less access to indirect contacts, which are the channels through which new information is reached. Therefore, the provision of new information is more limited in a homogeneous network than in a heterogeneous network, which increases the chance that attitudes and opinions are mostly shared in a homogeneous network (Granovetter, 1973). Moreover, Burt (2004) has demonstrated that individuals in heterogeneous networks are more at ease with other ways of thinking and behaving than people in homogeneous networks (Burt, 2004).

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[1] Wet bijzondere maatregelen grootstedelijke problematiek, 2005

In 1973, Laumann conducted a research on the influence of network characteristics on attitudes towards political and social issues. His research showed that men in a more heterogeneous network felt more freedom to form their own political preference than men in a homogeneous network (Laumann, 1973). It was also found that people who are embedded in networks with like-minded others are more likely to stay by their opinion when they are confronted with an opposite and persuasive message, compared to people who are in attitudinally heterogeneous networks (Visser and Mirabile, 2004). These studies, however, are conducted only among American citizens, which raises questions about their representativeness for Dutch society.

The research of Frenk (2010) is as far as we know the most recent research that examines the network composition and its influence on attitudes towards different issues among Dutch citizens. Her study also demonstrates that heterogeneity with respect to gender, age, nationality, religion and education is related to more open-minded attitudes, which is in accordance with earlier and non-Dutch studies. For her research, she used the Survey of the Social Networks of the Dutch (SSND, Völker & Flap, 2007), which provides extensive data on the networks of the Dutch and also contains several attitudinal questions. However, a weakness of Frenk's study (Frenk, 2010) as well as of other previous research, is that causality could not be established, partly due to a lack of panel data. At the time of Frenk's research, there was only one wave of the SSND available with questions about open-mindedness. Whether the heterogeneity does have an effect on open-mindedness, or if the heterogeneity of one's network is only an indication of how open-minded one already was, could not be determined.

Recently, a third wave of the SSND has been constructed (SSND, Völker & Flap, 2011). This enables us to make use of two waves of the same survey, which provides us with a substantial amount of panel data. Not only will we add this longitudinal component - enabling us to measure changes in composition – we will also make a distinction between the so-called 'core discussion - and colleague networks', which has not been done in prior research. We assume that an individual chooses his discussion partners, but his colleagues are assigned to him. This distinction might even more clarify the problem of causality; do individuals have certain beliefs on which they base their choice in discussion partners, or are their opinions and beliefs influenced by the people around them (e.g. their colleagues)? If there are clear effects of both the discussion network and the colleague network on attitudes towards different minded individuals (such as homosexuals, people with a different religion

or nationality, etc.), it could be possible to make a clearer assumption of the direction of the effect.

The aim of this research is to address this problem of causality, firstly by making a distinction between the discussion networks and the colleague networks and secondly by using the available panel data. Furthermore, it aims to examine whether changes in the heterogeneity of a network influence the open-mindedness of the respondent. In the following sections of this paper, it will be explained why influence of network composition on open-mindedness is to be expected. Furthermore, the methods, analyses and results of this research will be presented. The paper will conclude with a brief conclusion and discussion of this research.

2. Theory

There is no such thing as an objective criterion for a view or opinion. The social comparison theory postulates that people therefore compare their views to those of the people around them (Festinger, 1954). Groups, or social networks, are '*the webs of interpersonal relationships that link individuals to others in their social environment*' (Visser & Mirable, 2004). A personal network can consist of friends, family, colleagues or neighbours. There are two types of measuring social networks: complete network data or ego network data. This research is based on ego network data, which means that the ego has given all the information on his friends and acquaintances. This is contrary to complete network data, in which all friends and acquaintances are interviewed themselves.

In modern times, bonds between people are not anymore solely characterized as dense ties, often based on kinship or neighbourhood. Therefore, ego network data has nowadays an advantage over complete network data since it can access more information about ties that are not specifically close to the ego. In this ego network data, the ego is asked to list the names and characteristics (such as gender, age, nationality, etc.) of his friends, colleagues, neighbours, acquaintances and internet-relations.

It might be that the characteristics of such a network have an influence on one's open-mindedness. We define open-mindedness, in this case, as the extent to which one tolerates diverging opinions or people with diverging opinions.

2.1 Composition of the network

The composition of an ego network can vary on the degree of heterogeneity, with extremes of either completely homogeneous or heterogeneous networks, regarding different aspects such as age, job status, gender, nationality or educational level. When forming or entering a social network, the 'homophily principle' often occurs. Homophily simply means that 'birds of a feather flock together' (McPherson et al., 2001). People with the same social and educational background, nationality and age have more chance of winding up with each other, because they feel more at ease with one another (Marsden, 1988). This principle also holds for attitudes and opinions; since these values are likely to be shared among the network members, people are more inclined to make contact with like-minded individuals. Thus, due to this principle, people more often wind up in a homogeneous network (McPherson et al., 2001; Kendel, 1978).

It is argued that individuals in such a homogeneous network are more likely to receive a limited amount of varying information, since the people around them have access to the same information. Based on this little amount of information, there is often one majority opinion on what is right or wrong (Granovetter, 1973). In a more homogeneous network, people receive less divergent information. Therefore, they are more inclined to be less open-minded towards people with certain believes or ways of life (e.g. homosexuals), since they have limited knowledge about these phenomena (McPherson, Smits-Lovin & Cook, 2001).

In addition to that, a person in a homogeneous network is less likely to become acquainted with other individuals that are dissimilar to the characteristics that are shared in the person's social network (Granovetter, 1973). The contact theory (Allport, 1954) argues that becoming acquainted with dissimilar people decreases the chance of having prejudices towards people with certain believes or ways of life. Thus, individuals in a homogeneous network are more inclined to hold on to certain prejudices and are therefore less open-minded (Allport, 1954; Pettigrew & Tropp, 2006).

Furthermore, it is assumed that an individual always compares his opinion to that of others and as a result receives a positive or negative reinforcement (Festinger, 1954). In addition, Kelley (1952) exposes the reference group theory. This theory argues that there are certain reference groups that provide the individual information on what behaviour or view is desirable (Kelley, 1952). The same mechanism can account for a negative response. When an individual expresses a different view than the group norm, they may be socially punished for expressing it (Deutsch & Gerard, 1955). This type of influence can be referred to as normative influence.

Seen that an individual can experience discomfort when expressing a divergent view, it makes one less likely to do so. The balance theory explains how a cognitive imbalance leads to social discomfort. The stronger the cognitive imbalance between an individual and the rest of the group, the stronger the discomfort (Heider, 1958). The opposite occurs when one interacts with people from different social backgrounds. In that case, someone is confronted with different social norms and different sources of information (Burt, 2004). An individual will therefore be forced to reflect on these different views and make a decision on which norm he adheres to (Lazarsfeld, Berelson, & Gaudet, 1944).

Following the previous mechanisms, we expect homogeneous networks to have a negative influence on one's open-mindedness and therefore heterogeneous networks to have a positive influence on one's open-mindedness.

Thus, the first hypothesis (H1) states that *if the heterogeneity of some person's network is higher, the more open-minded this person will be.*

Moreover, Visser and Mirabile (2004) proposed the theory of informal influence. This theory is consistent with the balance theory (Heider, 1958) and normative influence principle (Deutsch & Gerard, 1955) in the sense that cognitive imbalance provides a certain discomfort which may lead to a change in opinion. In addition, the informal influence theory also argues that this 'majority opinion' in turn reinforces the attitude strength of its group members. So after making an attitudinal compromise, this attitude gets more adapted by the individuals. The stronger this group homogeneity is, the more resistant the individual becomes to alternative opinions and thus become less open-minded. The theory argues that the *durability* of an attitude strengthens with the level of network homogeneity (Visser and Mirabile, 2004). Since we think a change in network heterogeneity can cause changes an individual's open-mindedness, our second hypothesis (H2) states that *if the heterogeneity of some person's network increases, the more open-minded this person will become.*

2.2 Discussion network and colleague network

We expect heterogeneity of the network to have a positive effect on the open-mindedness of the ego. However, it might also be the other way around; open-mindedness might have a positive effect on the heterogeneity of the network, because open-minded people might select a more open, varied environment. To test the direction of the effect, we made a distinction between discussion networks and colleague networks.

People are part of a certain discussion network, consisting of their family, household members and friends. This is called the discussion network, because important matters are discussed with these network members. The colleague network is a different kind of network. Whereas the respondent can compose his discussion network, presumably by choosing close family members and friends as its members, he cannot compose his colleague network. An employee cannot choose his colleagues, but is assigned to them.

Thus, if a positive association between heterogeneity and open-mindedness is found for the core discussion network (i.e. friends), this could be because the respondent was open-minded in the first place and therefore selected friends with diverging characteristics. However, if the positive association is also found for the colleague network, then there is an indication for a causal relationship, since colleagues do not have the opportunity to select each other.

3. Data and methods

3.1 Data

The dataset used to investigate the influence of network heterogeneity on open-mindedness is the Survey of the Social Networks of the Dutch (SSND), conducted by Völker and Flap. The SSND was first conducted in 2000. A second and third wave followed in respectively 2007 and 2011. We only make use of the second and third wave, because the items we use to measure open-mindedness are not included in the first wave.

The respondents are randomly selected from Dutch neighborhoods, in which 12 to 13 households with people between 18 and 65 years old were addressed. This resulted in 1007 respondents in 2000, of which 604 were re-interviewed in 2007 and 394 new respondents were added. Out of this second wave, 460 respondents were re-interviewed in 2011. Some of these cases turned out to be invalid due to missing values on the measurements of the network characteristics. For wave 2 this gives us $N_2 = 166$, for wave 3 $N_3 = 205$. Because some cases could not be matched, $N_{2-3} = 143$ in the analysis of the change between wave 2 and 3.

3.2 Model

We examine the relationship between heterogeneity and open-mindedness in three steps.

Step 1

Firstly, we use an Ordinary Least Square (OLS) regression model to study the relationship between network heterogeneity and open-mindedness of the ego for the second wave. The characteristics of the network members used to measure the heterogeneity of the respondent's network are gender, age, religion, education and nationality. Afterwards, we conduct the same analysis for the third wave. A schematic overview of this first analysis is given in Figure 1.

Figure 1: Network heterogeneity and open-mindedness
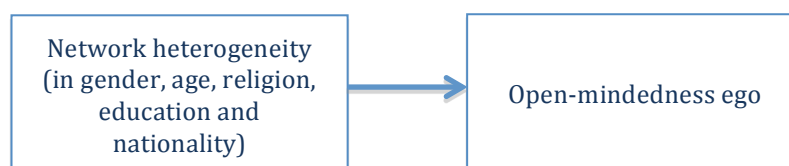
Step 2

Due to the cross-sectional usage of the data, it is not possible to determine a causal direction in this assumed relationship. In case of a heterogeneous network, one cannot determine whether the ego has a heterogeneous network because he is open-minded, or if he became open-minded because of the heterogeneity of the network. As explained in the theory section, discussion partners have the opportunity to select each other, whereas colleagues do not. If a positive association between heterogeneity and open-mindedness is found for the core discussion network (i.e. friends), this could be because the respondent was open-minded in the first place and therefore selected friends with diverging characteristics. If the positive association is also found for the colleague network, causality (i.e. the composition of the network influences the open-mindedness of the ego) can be established, since colleagues do not have the opportunity to select each other.

Therefore, we conduct the same OLS regression as in step 1 separately for the discussion – and colleague network.

Figure 2: Heterogeneity in discussion and colleague networks and open-mindedness
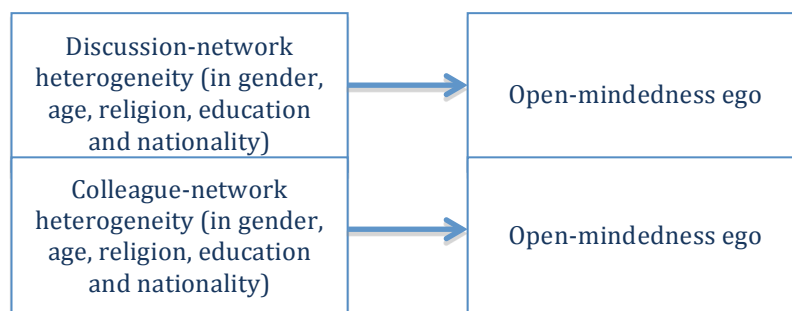
These analyses are conducted for both wave 2 and wave 3 separately.

Step 3

At this point, we run our fifth analysis, measuring if a change in open-mindedness is related to a change in heterogeneity. Firstly, a paired sample t-test shows if the open-mindedness of the ego and the heterogeneity of the networks have changed significantly over the two waves. Then, an OLS regression is conducted to measure the change in open-mindedness and to what extent this can be explained by the change in heterogeneity.

$$\Delta OM = \alpha + \Delta heterogeneity + OM_2 + \varepsilon$$

This third step could be considered a double check; since we control for all individual characteristics that could change over time, possible side effects of these characteristics are ruled out. If the results of this analysis show a significant effect of network heterogeneity on open-mindedness, and so do our previous analyses, we can conclude with more certainty that there indeed is an effect of network heterogeneity on open-mindedness.

3.3 Measurements

3.3.1. Dependent variable

Open-mindedness – defined as the extent to which one tolerates different diverging opinions or people with diverging opinions - is operationalized by using several variables. The respondent is asked who he would rather not have as a neighbor. This is asked for ten different characteristics. Namely[2];

      a. people with a different religion

      b. immigrants

      c. people with a serious illness, for example aids

      d. people with another nationality

      e. homosexuals

      f. people with a criminal background

      g. political extremists

      h. alcoholics

      i. emotionally instable people

      j. drug addicts

As stated above, open-mindedness not only reflects one's open-mindedness towards diverging opinions, but also towards people with diverging opinions. The questions above present a good measurement of the last aspect. If one does not want a neighbor who has a different religion, one does not tolerate this. To the question if they would want certain people as their neighbor, respondents could answer either 'definitely not', 'rather not' or 'does not matter' on a 3-point scale.

In order to detect latent factors in open-mindedness, a maximum likelihood factor analysis with oblique rotation of these variable demonstrates two factors of open-mindedness. The first factor contains the first five items (a-e) and the second factor is reflected in items f - j.

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[2] This is not the order in which these preferences for characteristics were asked during the interview.

This leads us to distinct two types of open-mindedness; plain open-mindedness (i.e. emotional open-mindedness) and open-mindedness to protect oneself (i.e. rational open-mindedness). The first category is simply an open-mindedness towards people with different sexual orientation, religion, heritage or health condition (1). The second category also indicates a type of open-mindedness, although this type is associated with the desire to protect oneself against nuisance of, for example, criminals, political extremists or drug/alcohol addicts (2). The two categories are constructed by taking the mean of all the items and by dividing these by the number of items. Reliability analyses show a Cronbach's alpha of respectively α =.619 and α =.729 for the second wave, and α =.727 and α =.732 for the third wave, indicating a reliable measurement of open-mindedness (Carmines & Zeller, 1979)

3.3.2 Independent variables

The main independent variables measure how heterogeneous a respondent's network is with respect to age, gender, education, nationality and religion. For the metric variables age and education, we measure the heterogeneity in the network by the standard deviation.

For the non-metric variables – religion, gender and nationality - we used an Index of Qualitative Variation (IQV) to construct the heterogeneity measure. Thus, our measure for heterogeneity in gender, for example, is;

$$IQV\,gender\ =\ \frac{(1 - proportion\ males^2 - \ proportion\ females^2)}{1 - 0.5}$$

Secondly, we construct a measurement of overall heterogeneity by combining age, gender, education, nationality and religion into one heterogeneity measure.

3.3.3 Control variables

A set of further characteristics of the respondent is expected to influence the open-mindedness. In our analyses, we control for gender, education (in years), age, income (measured in steps of €250/month), nationality (Dutch or other), and religion (catholic, protestant, other or no religion). We control for these variables because these characteristics, such as religion, might influence the respondents open-mindedness, while we are looking for a possible influence of network heterogeneity on open-mindedness.

3.4 Descriptive statistics

Table 1. Descriptive statistics

	WAVE 2				WAVE 3				CHANGE			
	MIN	MAX	MEAN	SD	MIN	MAX	MEAN	SD	MIN	MAX	MEAN	SD
Dependent variables												
Emotional open-mindedness	1.20	3.00	2.86	.25	1.40	3.00	2.90	.21	-1.00	1.00	.04	.22
Rational open-mindedness	1.00	3.00	1.89	.42	1.00	3.00	1.92	.42	-0.80	1.00	.03	.37
Independent variables												
Overall heterogeneity	.02	.63	.36	.11	.09	0.70	.42	.10	-.30	.39	.05	.13
Heterogeneity gender	.00	1.00	.75	.31	.00	1.00	.76	.28	-1.00	1.00	.02	.39
Heterogeneity age	2.12	37.48	13.37	5.52	2.16	29.65	13.97	4.41	-20.04	20.32	.59	6.06
Heterogeneity education	.00	8.49	2.25	1.19	.00	5.90	2.13	.93	-6.90	3.83	-.12	1.30
Heterogeneity religion	.00	.92	.36	.27	.00	0.94	.42	.28	-.71	.80	.03	.29
Heterogeneity nationality	.00	.63	.06	.13	.00	0.80	.08	.14	-.49	.53	.03	.16
Control variables												
Education	6.00	17.00	12.75	2.81	6.00	17.00	12.79	2.82	.00	4.00	.04	1.03
Age	19.00	89.00	55.76	11.70	30.00	93.00	59.93	11.52	4.00	5.00	4.20	.08
Male (gender)			.54				.54					
Nationality (Dutch)			.95				.95					
Income (in steps of €250)	1.00	17.00	7.92	3.86	1.00	17.00	9.05	4.12				
Religion												
Protestant	.00	1.00	.20	.40	.00	1.00	.22	.41	-1.00	1.00	.02	.28
Catholic	.00	1.00	.21	.41	.00	1.00	.17	.38	-1.00	1.00	-.03	.31
Other religion	.00	1.00	.05	.22	.00	1.00	.03	.16	-1.00	1.00	-.02	.26
No religion	.00	1.00	.54	.50	.00	1.00	.58	.50	-1.00	1.00	.03	.37
N		**165**				**200**				**143**		

Table 1 shows some descriptives of the variables. Dutch personal networks in wave 2 are more heterogeneous in gender (M = .75) than they are in religion (M = .36) or nationality (M = .06). The average years of education of the respondents is rather high (M = 12.75), as is the average age of a respondent (M = 55.76). Almost all respondents are of Dutch origin (94.57%) and a fair majority is atheistic (54.35%). In wave 3, the percentage of religious respondents has decreased further, with 57.61% being atheistic.

The last panel shows the change in heterogeneity and open-mindedness between wave 2 and wave 3, which is quite low. However, a paired sample t-test illustrates that the overall heterogeneity has significantly increased over the two waves, with a mean paired difference of $\mu = .056$, $p < .001$. This indicates that the networks of the respondents have become more heterogeneous in the 4 years between the interviews. Also, another paired sample t-test shows that the emotional open-mindedness of the egos has increased in those 4 years ($\mu = .038$, $p < .05$). Rational open-mindedness does not show significant difference between the two waves ($\mu = .031$, $p = .290$).

4. Results

In this section, the results of the analyses will be described, following the stepwise order as displayed in the description of the model. Firstly, the results of the general analyses separately for wave 2 and wave 3 will be described. Next, findings of the analyses that are conducted separately for the discussion network and the colleague network are displayed. Finally, we give the results of the analyses that are conducted with the two waves together.

4.1 Network heterogeneity

4.1.1 Emotional open-mindedness

Table 2. OLS regression results of overall heterogeneity on emotional open-mindedness.

	WAVE 2 (N=166)			WAVE 3 (N=205)		
	b^3	(s.e.)	p-value	b	(s.e.)	p-value
Network characteristics						
Overall heterogeneity	.388**	.179	.032	.455**	.148	.002
Individual characteristics						
Male	-.039	.043	.361	-.059	.036	.107
Education	.026**	.008	.002	.008	.007	.197
Age	-.003	.002	.066	.001	.002	.601
Income	.004	.006	.530	.003	.005	.477
Nationality (other)						
Dutch	-.063	.075	.398	.071	.073	.333
Religion (none)						
Catholic	.076	.052	.143	-.031	.040	.441
Protestant	.066	.052	.205	.076**	.038	.046
Other	.074	.105	.479	-.004	.080	.960
Constant	2.565***	.176	.000	2.476***	.154	.000
R²	.175			.112		

* p < .1 ** p < .05 *** p < .01

Table 2 shows the results of the first regression analysis. Ordinary Least Squares (OLS) regression is used to assess the relationship between network heterogeneity and emotional open-mindedness. Controlled for individual characteristics, we find heterogeneity to be significantly positively associated with open-mindedness in wave 2 ($b = .388$, $p < .05$) and wave 3 ($b = .455$, $p < .01$). Thus so far, H1 is confirmed, meaning that if the heterogeneity of some person's network is higher, the more open-minded this person is.

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[3] The B-coefficients reflect the unstandardized coefficients for all the included tables.

To get a more detailed picture of the relationship between heterogeneity and open-mindedness, we explore five different measurements of heterogeneity, namely gender, age, education, religion and nationality. The results for emotional open-mindedness are shown in Table 3.

Table 3. OLS regression results of five heterogeneity characteristics on emotional open-mindedness

	WAVE 2 (N=166)			WAVE 3 (N=205)		
	b	(s.e.)	p-value	b	(s.e.)	p-value
Network characteristics						
Heterogeneity gender	.101	.071	.154	.031	.054	.566
Heterogeneity age	-.002	.004	.676	.006*	.004	.089
Heterogeneity religion	.191**	.074	.011	.156***	.054	.004
Heterogeneity education	-.001	.018	.966	-.004	.019	.818
Heterogeneity nationality	-.092	.164	.578	.057	.108	.597
Individual characteristics						
Male	-.029	.044	.521	-.061*	.037	.099
Education	.022**	.009	.010	.009	.007	.195
Age	-.003*	.002	.096	.001	.002	.519
Income	.002	.006	.704	.003	.005	.546
Nationality (other)						
Dutch	-.078	.079	.330	.065	.078	.403
Religion (none)						
Catholic	.079	.052	.133	-.022	.040	.581
Protestant	.062	.054	.247	.067*	.038	.081
Other	.037	.107	.731	-.016	.081	.839
Constant	2.641***	.181	.000	2.490***	.160	.000
R²	.199			.131		

* $p < .1$, ** $p < .05$, *** $p < .01$

Heterogeneity in religion is significantly positively associated with emotional open-mindedness, both in wave 2 ($b = .191$, $p < .05$) and wave 3 ($b = .156$, $p < .01$). This is again in line with hypothesis 1, meaning that if a person has people with more diverse religions in his network, the more open-minded this person is towards immigrants, people with a different religion, etc. Also, heterogeneity in age is borderline positively associated with emotional open-mindedness in wave 3 ($b = .006$, $p < .1$).

16

4.1.2 Rational open-mindedness

Now, we again run two separate analyses with rational open-mindedness as dependent variable.

Table 4 shows the results of the regression analysis with overall heterogeneity as independent variable. Overall heterogeneity seems not to be related with rational open-mindedness, therefore this analysis does not show support for hypothesis 1, meaning that there is not a relationship between the composition of the network and being open-minded towards alcoholics, drug addicts, people with a criminal background etc. We do find a negative effect of the age of the respondent in wave 2, indicating that the older a person is, the less open-minded he is towards the people as described above. Also, there is a positive effect of being Protestant on the open-mindedness, indicating that being a protestant is associated with being more open-minded towards these 'outlaws of society'.

Table 4. OLS regression results of overall heterogeneity on rational open-mindedness

	WAVE 2 (N=168)			WAVE 3 (N=200)		
	b	(s.e.)	p-value	b	(s.e.)	p-value
Network characteristics						
Overall heterogeneity	-.189	.302	.533	.328	.312	.295
Individual characteristics						
Male	-.007	.072	.918	-.103	.076	.178
Education	.002	.014	.862	.008	.014	.562
Age	-.007***	.003	.006	-.002	.004	.562
Income	.016	.010	.116	-.001	.010	.906
Nationality (other)						
Dutch	-.063	.125	.616	.230	.158	.149
Religion (none)						
Catholic	.060	.086	.489	.062	.084	.465
Protestant	.117	.086	.177	.165**	.079	.039
Other	.137	.192	.476	.044	.166	.790
Constant	2.236***	.297	.000	1.632***	.329	.000
R²	.085			.060		

* p < .1, ** p < .05, *** p < .01

Table 5 shows the results of the regression analysis with five heterogeneity measurements as independent variables. The results show only one significant relation with rational open-

minded, for only wave 3; heterogeneity in nationality (b = .599, p < .05). Having more contact with diverse nationalities is positively related to being open-minded towards the outlaw of society. This is in line with the first hypothesis. The age of the respondent shows again a very small negative effect on open-mindedness, and also being a protestant has the same relationship to open-mindedness as earlier (b = .165, p < .05). Moreover, being Dutch seems to have a positive influence on rational open-mindedness (b = .285, p < .1).

Table 5. OLS regression results of five heterogeneity characteristics on rational open-mindedness

	WAVE 2 (N=165)			WAVE 3 (N=200)		
	b	(s.e.)	p-value	b	(s.e.)	p-value
Network characteristics						
Heterogeneity gender	.039	.119	.744	.045	.112	.690
Heterogeneity age	-.007	.007	.338	.012	.008	.124
Heterogeneity religion	.019	.127	.882	-.053	.112	.638
Heterogeneity education	-.021	.030	.487	-.051	.040	.199
Heterogeneity nationality	-.003	.277	.990	.599**	.233	.011
Individual characteristics						
Male	.014	.075	.857	-.103	.077	.182
Education	-.002	.015	.914	.011	.014	.456
Age	-.007***	.003	.008	-.003	.004	.459
Income	.016	.011	.136	-.002	.010	.842
Nationality (other)						
Dutch	-.046	.134	.730	.285*	.166	.087
Religion (none)						
Catholic	.072	.088	.416	.072	.084	.391
Protestant	.132	.090	.147	.165**	.079	.039
Other	.129	.196	.512	-.021	.167	.901
Constant	2.288***	.307	.000	1.605***	.337	.000
R²	.095			.101		

* *p* < .1, ** *p* < .05, *** *p* < .01

A notable remark is that the findings show low R-squares for the analyses on rational open-mindedness. This indicates that network heterogeneity and the individual characteristics only explain around 10% of the variance in rational open-mindedness. When the same analyses are conducted on emotional open-mindedness, around 15% of the variance can be explained.

4.2 Discussion network versus colleague network

The following analyses are conducted separately for those who the respondent named as his 'core discussion network', with whom he discusses personal and important matters, and for those who he named as his colleagues.

4.2.1. Emotional open-mindedness

Table 6 shows the results of the regression analysis of overall heterogeneity on emotional open-mindedness. The results demonstrate significant positive effects of overall heterogeneity on open-mindedness, which is again in line with hypothesis 1. These effects are found for both wave 2 and 3, and for the discussion network as well as for the colleague network. The effects indicate again that persons with more heterogeneous networks are more open-minded towards people with incurable diseases, homosexuals, immigrants, etc. than people with more homogeneous networks. It does not matter if these networks consist of only discussion partners or even only colleagues; the relationship still is found.

There are some individual effects of the control variables. The years of education of the respondent has a small influence on his open-mindedness in wave 2 ($b = .031$, $p < .01$). The effect does not exist for the analyses tested with colleagues, and it is also not found in the analyses for wave 3. In wave 3, the gender of the respondent is significantly negatively related to emotional open-mindedness, indicating that men are less open-minded towards the incurable, homosexuals, immigrants etc. than women. Also, being a protestant has again a small positive effect on open-mindedness. This effect was also found in the general analyses, which included all the members of the networks.

Table 6. OLS regression results of overall heterogeneity on emotional open-mindedness, separately for discussion partners and colleagues in wave 2 and 3.

	WAVE 2						WAVE 3					
	DISCUSSION (N=143)			*COLLEAGUE (N=57)*			*DISCUSSION (N=194)*			*COLLEAGUE (N=163)*		
	b	(s.e.)	p-value	b	(s.e.)	p-value	b	(s.e.)	p-value	b	(s.e.)	p-value
Network characteristics												
Overall heterogeneity	.440**	.199	.029	.797**	.353	.029	.474***	.153	.002	.524***	.163	.002
Individual characteristics												
Male	-.044	.049	.364	-.023	.094	.809	-.065*	.038	.087	-.079*	.042	.059
Education	.031***	.009	.001	.020	.022	.371	.005	.007	.481	.009	.007	.204
Age	-.001	.002	.492	.007	.004	.125	.001	.002	.562	.002	.002	.247
Income	.004	.007	.615	-.001	.015	.923	.004	.005	.435	.005	.006	.380
Nationality (other)												
Dutch	-.061	.077	.427	.044	.126	.729	.093	.080	.247	-.022	.087	.801
Religion (none)												
Catholic	.048	.057	.402	.131	.113	.252	-.038	.042	.363	-.009	.042	.835
Protestant	.069	.058	.233	.097	.108	.374	.081*	.041	.053	.083*	.043	.053
Other	.073	.149	.626	-.064	.298	.831	.000	.082	1.000	-.001	.102	.990
Constant	2.401***	.196	.000	1.980***	.393	.000	2.487***	.161	.000	2.449***	.175	.000
R²	.182			.197			.114			.154		

$* p < .1, ** p < .05, *** p < .01$

Table 7. OLS regression results of five heterogeneity measurements on emotional open-mindedness, specified for discussion partners and colleagues in wave 2 and 3.

	WAVE 2						WAVE 3					
	DISCUSSION (N=143)			*COLLEAGUE (N=57)*			*DISCUSSION (N=192)*			*COLLEAGUE (N=163)*		
	b	(s.e.)	p-value	b	(s.e.)	p-value	b	(s.e.)	p-value	b	(s.e.)	p-value
Network characteristics												
Heterogeneity gender	.189**	.084	.026	.360**	.156	.026	.042	.057	.464	.011	.060	.861
Heterogeneity age	-.001	.005	.771	-.004	.011	.720	.006	.004	.148	.006	.004	.138
Heterogeneity religion	.142*	.083	.090	.051	.164	.755	.165***	.057	.004	.184***	.060	.002
Heterogeneity education	-.004	.019	.847	-.019	.048	.686	-.006	.020	.772	.003	.021	.875
Heterogeneity Nationality	-.078	.172	.651	.476	.377	.214	.054	.112	.629	.139	.126	.270
Individual characteristics												
Male	-.024	.050	.638	.002	.097	.981	-.068*	.039	.083	-.086**	.042	.043
Education	.026***	.009	.007	.016	.023	.506	.006	.007	.448	.010	.007	.188
Age	-.001	.002	.465	.008	.005	.105	.001	.002	.463	.002	.002	.220
Income	.003	.007	.693	.000	.016	.997	.003	.005	.496	.005	.006	.418
Nationality (other)												
Dutch	-.081	.082	.328	.119	.155	.445	.084	.086	.331	.006	.094	.948
Religion (none)												
Catholic	.051	.059	.391	.192	.125	.132	-.027	.042	.529	.000	.042	1.000
Protestant	.067	.060	.268	.162	.123	.193	.071*	.042	.092	.081*	.043	.065
Other	.056	.153	.718	.005	.323	.988	-.010	.083	.906	-.011	.103	.913
Constant	2.473***	.200	.000	1.955***	.427	.000	2.500***	.168	.000	2.444***	.182	.000
R²	.208			.245			.132			.181		

* *p* < .1, ** *p* < .05, *** *p* < .01

Table 7 demonstrates the results of the analyses with five types of heterogeneity as independent variables. In wave 2, heterogeneity in gender is significantly positively related to emotional open-mindedness for discussion partners ($b = .189$, $p < .05$) and colleagues ($b = .360$, $p < .05$). There is also a positive relation between heterogeneity in religion and emotional open-mindedness, indicating that having diverse religions in networks consisting of friends or colleagues is related to a higher level of open-mindedness. With regards to the individual characteristics, the years of education of the respondent is again positively related to more open-mindedness. However, this effect is only found for wave 2 and does not exist when only the networks consisting of friends are included in the analysis. Also, there are small, but significant effects of being male and being a protestant on emotional open-mindedness. Being male is negatively related to being open-minded ($b = -.068$, $p < .1$; $b = -.086$, $p < .1$), and being a protestant is positively associated with being open-minded ($b = .071$, $p < .1$; $b = .81$, $p < .1$).

4.2.2. Rational open-mindedness

Table 8 shows the results of the regression analysis of overall heterogeneity on rational open-mindedness. Interestingly, we only find significant results of overall heterogeneity on rational open-mindedness for the colleague networks. Because no relationship between overall heterogeneity and rational open-mindedness is found in previous analyses, this is a striking result. When we take a closer look, the relationship is negative in wave 2 ($b = -1.314$, $p < .05$) whereas it is positive in wave 3 ($b = .524$, $p < .01$). We will elaborate on this remarkable finding in the discussion section.

There are three effects of the individual characteristics on rational open-mindedness. The effect of the respondent's age in the discussion network is strongly significant ($b = -0.008$, $p < .01$), indicating that the younger the ego in a discussion network is, the more open-minded he is. In wave 3, we find men in colleague networks to be less open-minded than women in colleague networks. Again, Protestants are found to be more open-minded, but only in wave 3.

Table 8. OLS regression results of overall heterogeneity on rational open-mindedness, specified for discussion partners and colleagues in wave 2 and 3

	WAVE 2						WAVE 3					
	DISCUSSION (N=142)			COLLEAGUE (N=57)			DISCUSSION (N=187)			COLLEAGUE (N=163)		
	b	(s.e.)	p-value	b	(s.e.)	p-value	b	(s.e.)	p-value	b	(s.e.)	p-value
Network characteristics												
Overall heterogeneity	-.063	.329	.847	-1.314**	.513	.014	.368	.316	.246	.524***	.163	.002
Individual characteristics												
Male	.027	.079	.736	.008	.136	.951	-.106	.078	.176	-.079*	.042	.059
Education	-.005	.015	.763	.020	.031	.516	.003	.015	.856	.009	.007	.204
Age	-.008***	.003	.007	.004	.006	.541	-.002	.004	.525	.002	.002	.247
Income	.014	.012	.219	-.008	.022	.718	.003	.010	.775	.005	.006	.380
Nationality (other)												
Dutch	-.106	.127	.404	-.021	.183	.909	.174	.170	.306	-.022	.087	.801
Religion (none)												
Catholic	.031	.093	.739	-.091	.163	.579	.034	.086	.691	-.009	.042	.835
Protestant	.152	.093	.105	.021	.157	.894	.191**	.085	.026	.083*	.043	.053
Other	-.011	.299	.972	no valid values			.047	.167	.780	-.001	.102	.990
Constant	2.337***	.321	.000	2.094***	.570	.001	1.728***	.338	.000	2.449***	.175	.000
R²	.089			.145			.060			.154		

* *p* < .1, ** *p* < .05, *** *p* < .01

Table 9. OLS regression results of five heterogeneity measurements on rational open-mindedness, specified for discussion partners and colleagues in wave 2 and 3.

	WAVE 2						WAVE 3					
	DISCUSSION (N=142)			COLLEAGUE (N=57)			DISCUSSION (N=187)			COLLEAGUE (N=162)		
	b	(s.e.)	p-value	b	(s.e.)	p-value	b	(s.e.)	p-value	b	(s.e.)	p-value
Network characteristics												
Heterogeneity gender	.070	.138	.611	-.195	.231	.404	.091	.116	.435	.060	.130	.646
Heterogeneity age	-.005	.008	.471	-.017	.016	.291	.008	.008	.312	.015	.009	.113
Heterogeneity religion	.006	.137	.965	-.382	.243	.122	-.048	.116	.681	-.078	.130	.549
Heterogeneity education	-.012	.031	.711	-.034	.070	.636	-.038	.041	.364	-.024	.047	.606
Heterogeneity nationality	.040	.282	.887	.216	.560	.702	.551**	.239	.023	.529*	.278	.059
Individual characteristics												
Male	.045	.083	.585	.014	.143	.923	-.101	.079	.202	-.128	.092	.166
Education	-.007	.016	.635	.021	.034	.548	.005	.015	.746	.008	.016	.628
Age	-.008***	.003	.008	.005	.007	.489	-.003	.004	.411	-.003	.004	.556
Income	.015	.012	.223	-.007	.023	.762	.002	.010	.840	.000	.012	.983
Nationality (other)												
Dutch	-.089	.137	.517	.076	.230	.741	.239	.180	.188	.269	.204	.190
Religion (none)												
Catholic	.042	.097	.667	-.049	.185	.791	.045	.087	.603	.082	.092	.374
Protestant	.170	.099	.089	.078	.182	.669	.190*	.086	.029	.101	.095	.290
Other	.008	.309	.978	No valid values			-.002	.168	.989	.083	.222	.709
Constant	2.359***	.333	.000	2.040***	.633	.002	1.707***	.350	.000	1.532***	.398	.000
R²	0.096			0.162			0.091			0.078			

* *p* < .1, ** *p* < .05, *** *p* < .01

Table 9 demonstrates the results of the analyses with five types of heterogeneity as independent variables. For wave 3, we find a positive relationship between ethnical heterogeneity and rational open-mindedness for the discussion as well for the colleague networks. This is in line with our previous findings on the relationship between heterogeneity in nationality and open-mindedness. Why these effects do not occur in wave 2, is unsure. We will elaborate on this in the discussion section.

4.3 Change in network heterogeneity and open-mindedness

To establish whether the effects found in wave 2 and wave 3 are genuine, we regress the difference in heterogeneity on change in open-mindedness between wave 2 and wave 3. For example, if the religious heterogeneity in wave 3 increases significantly compared to that in wave 2, but the open-mindedness does not, one might wonder if there is actually an effect between religious heterogeneity and open-mindedness. To control for individual changes, we also subtract the control variables education and religion of wave 3 from those of wave 2. We do not include the control variables gender and nationality, since these cannot have changed over the years. We also control for the age of the respondent in 2007, since age can still be related to the open-mindedness of the respondent.

Table 10 shows the results of the analysis of the change in emotional open-mindedness between wave 2 and wave 3. We find that change in open-mindedness can be explained by a change in network heterogeneity ($b = .333$, $p < .05$). The second hypothesis '*if the heterogeneity of some person's network increases, the open-mindedness of this person will increase*' is confirmed. Taking the 5 heterogeneity types apart, we find change heterogeneity with regards to gender and age to have significant effects. Strikingly, heterogeneity in age has a negative relationship with emotional open-mindedness, indicating that the more diverse the network of the respondent is with respect to age, the less open-minded the respondent becomes. When the heterogeneity in gender increases, the ego becomes more open-minded.

Table 11 shows the results of change in heterogeneity on rational open-mindedness. None of the heterogeneity measurements show significant results on rational open-mindedness. We can conclude that there is no relationship between the composition of the networks and the open-mindedness towards criminals, alcoholics, drug addicts, etc.

Table 10. OLS regression results on change in emotional open-mindedness

N = 143	Overall heterogeneity			Five types of heterogeneity		
	B	(s.e.)	p-value	B	(s.e.)	p-value
Network characteristics (change in)						
Overall heterogeneity	.333**	.157	.036			
Heterogeneity gender				.105**	.052	.045
Heterogeneity age				-.007**	.003	.048
Heterogeneity religion				.100	.067	.139
Heterogeneity education				.020	.015	.169
Heterogeneity nationality				.019	.118	.874
Individual characteristics						
Age (2007)	-.001	.001	.566	-.001	.001	.536
Change education	-.004	.016	.781	-.004	.016	.801
Change religion	.015	.049	.768	.023	.049	.638
Emotional open-mindedness (2007)	-.607***	.071	.000	-.580***	.072	.000
Constant	1.798***	.236	.000	1.744***	.238	.000
R²	.373			.407		

* *p* < .1, ** *p* < .05, *** *p* < .01

Table 11. OLS regression results of change in heterogeneity on rational open-mindedness

N=140	Overall heterogeneity			Five types heterogeneity		
	B	(s.e.)	p-value	B	(s.e.)	p-value
Network characteristics (change in)						
Overall heterogeneity	.185	.244	.451			
Heterogeneity gender				.034	.080	.671
Heterogeneity age				-.005	.005	.342
Heterogeneity religion				.026	.106	.804
Heterogeneity education				.015	.024	.537
Heterogeneity nationality				.165	.191	.388
Individual characteristics						
Age (2007)	-.001	.002	.712	-.001	.002	.700
Change education	.028	.024	.250	.029	.024	.241
Change religion	-.088	.077	.252	-.084	.078	.284
Rational open-mindedness (2007)	-.468***	.075	.000	-.464***	.076	.000
Constant	.990***	.212	.000	.990***	.215	.000
R²	.244			.254		

* *p* < .1, ** *p* < .05, *** *p* < .01

5. Conclusion and discussion

The aim of this study is to shed light on the relationship between network heterogeneity and open-mindedness. Various research has indicated that network heterogeneity - with respect to gender, age, education, religion and nationality – is positively associated with open-mindedness (Bienenstock, Bonacich, & Oliver, 1990; Burt, 2000; McPherson, Smith-Lovin, & Cook, 2001; Visser & Mirabile, 2004; Frenk, 2010)

The hypotheses are based on numerous theories. Firstly, there is the information theory which states that if one has a homogenous personal network, one receives less divergent information. Therefore, one may form an opinion based on little information, excluding other opinions (McPherson, Smits-Lovin & Cook, 2001). This idea is also supported by Burt, who stated that when someone is less frequently confronted with different opinions, one sticks to his own opinion and that of his environment, making that person less open-minded towards other opinions (Burt, 2004). Deutsch and Gerard (1955) state that in a homogeneous environment, someone will be socially punished for expressing a divergent opinion. These mechanisms lead us to believe that there is a positive relationship between network heterogeneity and open-mindedness.

The second and the third wave of the Survey of Social Networks in the Dutch (Völker & Flap, 2007; 2011) is used to investigate the personal networks of the Dutch. The empirical evidence in this paper confirms findings of earlier research (e.g. (Bienenstock et al., 1990; Burt, 2000; McPherson et al., 2001; Visser & Mirabile, 2004; Frenk, 2010) by showing a positive relationship between network heterogeneity and open-mindedness, indicating that people with more heterogeneous networks are more open-minded towards different social groups than people with more homogeneous networks. Overall heterogeneity is significantly associated with more emotional open-mindedness (i.e. open-mindedness towards social groups as homosexuals, people with incurable diseases as AIDS, immigrants, etc.). To get a more detailed picture of the relationship, overall heterogeneity is divided into five types of heterogeneity (i.e. heterogeneity in gender, age, religion, education and nationality). These results show that heterogeneity in religion is positively significantly related to more (emotional) open-mindedness. These results are found for wave 2 as well as for wave 3. However, the findings do not show a significant effect of heterogeneity on rational open-mindedness, indicating that the composition of a network is not related to open-mindedness towards alcoholics, drug addicts, individuals with a criminal past, etc.

A particular advantage of this study compared to previous research, is the fact that we conduct analyses separately for the discussion network and the colleague network. These networks consist of those who named the respondent as his discussion partners, with whom he discusses important and personal matters, and those who he named as his colleagues. The main advantage of this distinction is that we are better capable of determining the direction of the relationship between network heterogeneity and open-mindedness with more certainty. Results of the analyses, conducted separately for networks consisting of discussion partners and respectively colleagues, demonstrate again significant, positive associations between overall network heterogeneity and emotional open-mindedness. Additionally, there are significant positive relationships found between network heterogeneity in gender (wave 2) and heterogeneity in religion (wave 3) and emotional open-mindedness. Interestingly, these results are found for the discussion network as well as for the colleague network. Therefore, we can argue with more certainty that individuals do not compose their network based on the (already existing) open-mindedness of its members, since it is not likely that individuals can choose their colleagues. Thus, the empirical evidence suggests that it is the network heterogeneity that influences the open-mindedness of the respondent, and that it is not the other way around.

Lastly, the analyses that examined the relationship between change in network heterogeneity and change in open-mindedness show again significant findings. Results of the paired sample t-test demonstrate a significant increase in the average open-mindedness as well as in the average heterogeneity over the years. Furthermore, findings show that change in (emotional) open-mindedness is positively associated with change in network heterogeneity. These results answer the research question of this study and confirm the hypotheses. However, these findings cannot establish a causal relationship between network heterogeneity and open-mindedness. We call this the problem of ecological fallacy. Firstly, the paired sample t-test demonstrates only significant changes on the aggregated level of network heterogeneity and open-mindedness. Where the open-mindedness of most of the individuals might have decreased slightly, and the open-mindedness of the others might have increased strongly, the average change in open-mindedness on group level will still be positive despite the several decreases in open-mindedness. This can also account for network heterogeneity. Thus, a significant change in both phenomena on the aggregated level does not say anything about a relation on the individual level, since it is not possible to

analyse individual changes in both open-mindedness and heterogeneity. Yet, the positive significant effect of change in heterogeneity on change in open-mindedness in the OLS regression does give substantial evidence for a relation between those phenomena. Since this analysis controls for characteristics that can change over time (such as age and religion), the possible influences of these characteristics are ruled out.

Thus, all the results as described above contain ample evidence to conclude that the heterogeneity of the network is positively related to the open-mindedness of the respondent, and more specifically, that it is the network heterogeneity that influences the open-mindedness.

A first limitation of these results is that although it is likely colleagues do not select each other, other mechanisms might be at work. A boss or director for example might not only choose his employees on the basis of competence, but also on the basis of personal traits. Furthermore, employees might seek out a company that fits to their view of life. In this way, a more open-, or close-minded network might be created.

Secondly, the number of significant relationships found is greater in wave 3 than in wave 2. This might be a result of the slightly smaller sample size of wave 2, due to missing values on the independent variables. Therefore, a lack of power might have led to insignificant results in wave 2.

Individual characteristics of the respondent that had a positive relationship with open-mindedness were educational background and being protestant. The higher educated a respondent is, the more open-minded he is. This is in line with earlier research (e.g. Jaspers, 2008). In some of the analyses, age has a negative relationship with open-mindedness. The younger the respondent, the more open-minded he or she is. This is also in line with previous research by Ganzeboom and Flap (1988).

Open-mindedness was split into two types of open-mindedness; emotional and rational open-mindedness. The first one simply being the extent to which one tolerates people with diverging views and opinions, the second one also being to protect oneself (e.g. against people with alcohol or drug abuse). Fewer to no effects were found on rational open-mindedness. We could explain this by the fact that most people wouldn't really like a drug or alcohol abuser as a neighbour, independent of how open-minded one is. The only type of heterogeneity that has an effect on rational open-mindedness is nationality in wave 3. This result stands out because of its single occurrence. We cannot find a sensible explanation for this effect, however it is notable that only 30% of the

respondents has a network with different nationalities, whereas 93.8% has a network consisting of people with different educational levels. Further research is necessary to uncover possible underlying mechanisms of this phenomenon.

One might argue that another limitation is the measurement of open-mindedness. The question the respondent answers is '*would you rather not live next to…*' In our opinion, this question provides a good measurement, because the extent to which someone feels comfortable next to different people, reflects someone's open-mindedness. On the other hand, one might see a neighbour almost every day. This might be confronting, in case of diverging views of life, and may say less about one's open-mindedness towards e.g. homosexuals in general. We think this is the best measurement, since this question really reflects someone's view on other ways of life. It is easy to say that you are 'okay' with e.g. homosexuality in general, without wanting to be in touch with the phenomenon.

Therefore, although this study is already a front runner in the research that is conducted on examining the relationship between network composition and open-mindedness, further research is necessary. Longitudinal data should be extended and collected among a greater number of citizens in order to improve the power of the analyses. Particularly, data on networks of colleagues should be expanded. Another improvement would be to control for live-events that might have influenced the respondent's view of life. Also, new measurements on open-mindedness should be created to address a clearer image of open-mindedness. When all this is achieved, the understanding of the relationship between network composition and open-mindedness could be further enhanced. In the meantime, policy makers should support initiatives that aim to bring people with different characteristics together, such as in Rotterdam, where under the Rotterdam law people with different socio-economic backgrounds are put together in neighbourhoods. Whether policy makers do this in a working- or a personal environment, this could have a positive influence on the acceptation of different and often underappreciated social groups in society.

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