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NETWORK DENSITY AND DIMENSIONS OF SOCIAL CAPITAL: AN INTEGRATION OF THE CLOSURE AND OPENNES ARGUMENT

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ABSTRACT

The article reports a study that examines the effects of network closure on social capital. The openness and the closure argument were integrated by distinguishing between social personal capital and prestige and education related social capital. Two different measures for network density were used: core network density and wider network density. Data from the first wave of the Survey of the Social Networks of the Dutch (1999-2000) was used to investigate the expected relations. The expected underlying mechanisms were also tested using measures for core network heterogeneity and core network trust. The results of the regression analyses did not support the openness and the closure argument. An interaction effect of core network heterogeneity and education on prestige and education related social capital was found. In line with various previous articles educational level, occupational prestige and occupational prestige from the father are found to be significant predictors for prestige and education related social capital.

Keywords: Social networks; social capital; personal support social capital; prestige and education related social capital; network density; network heterogeneity; network closure; dimensions of social capital, Survey of the Social Networks of the Dutch

1. Introduction

How to build an optimal career oriented social network? This question is important for anyone who wants to achieve a successful occupational career nowadays. In the process of finding a job for example, it could be useful for someone to ask around in his or her social network. Using the resources of people in one's network may help to find a better job. Therefore, to be better connected may have a positive influence on career opportunities (e.g. Burt, 1997; Seibert et al, 2001). Social connections serve however not only to get one a job, but also to give

one social and emotional support. Is it possible to build a network which serves both these purposes and are there differences between high and low status people for example? This article tries to contribute to answer this question by looking at the relations between network characteristics and purposes of social capital.

Many scholars from different research fields have investigated the relationship between social networks and social capital (e.g. Granovetter, 1973, 1985; Coleman, 1988; Burt, 1997, 2000; Lin, 1999, 2008). Social capital proves to be an explaining factor for career success (Podolny & Baron, 1997) and finding a job (Lin, Ensel & Vaugh, 1981; De Graaf & Flap, 1988; Lin & Dumin, 1996; Völker & Flap, 1999, Adler & Kwon, 2005) for example. There are however different views on which types of social networks facilitate the best social capital. This is partly because social capital is often measured as one concept, without regarding different dimensions. The main purpose of this article is to investigate the relationship between network features and specific dimensions of social capital. The second purpose is to gain insight in the underlying mechanisms of this relationship. That is where this research differs from contemporary research that mainly focuses on the outcomes of network characteristics. The focus in this paper will be on network closure as a network feature. This leads to the following research question: is there a significant relationship between network closure and specific dimensions of social capital? And what are the underlying mechanisms of these relationships?

2. Theory and hypotheses

2.1 Social capital, social networks and closure

Many different scholars who wrote about social capital have used different definitions for the concept (Coleman, 1988; Lin, 2008; Van der Gaag & Snijders, 2005, e.g.). Van der Gaag and Snijders (2005, p. 1) came up with a relatively simple, but clear, definition of social capital: "the collection of resources owned by the members of an individual's personal social network, which may become available to the individual as a result of their relationships". This clarifies that social capital is about resources from other people, which one could possibly use to achieve certain goals for oneself. Social capital is therefore generated through investment in social relations (Lin, 2008). Even with this definition social capital remains a very broad concept. This is why Lin (2008) made a distinction between (1) the *accessed* social capital someone has, which

includes all the available resources in someone's network; and (2) the *mobilized* social capital that someone has, which includes all the resources in someone's network that he or she has actually used. In this article the definition of *accessed* social capital is used. This is because I will build forth on the various dimensions of social capital as distinguished by Van der Gaag and Snijders (2005) and use the same dataset, namely the Survey on the Social Networks of the Dutch (SSND) dataset. Therefore, social capital is defined in this article, in the same way as Van der Gaag and Snijders (2005) did, as: "the collection of all potentially available network members' resources".

It should also be made clear that social network and social capital are not interchangeable terms. The social network in this article is defined as the people with whom someone has a social relationship and the structure of the connections between these people. Social networks can differ in various characteristics and in structure. The characteristics and the structure of a social network are called network features. These network features are still not the same as social capital and resources. Lin (2008, p.11) explains this clearly: "variations in networks or network features may increase or decrease the likelihood of having a certain quantity or quality of resources embedded". Adler and Kwon (2005) stated in other words that the social network structure within which the actor is located is the source of social capital.

Burt (2000) points out two important views about the relationship between network features and social capital. The first one he calls the closure argument, the other he calls the brokerage argument. I will call the latter the openness argument, because Burt's argumentation is mostly about the position of members in the network. I will apply these arguments merely to the degree of openness or closeness in the network. In both views density as a network characteristic is important. Density is the degree to which all people in a given social network are connected to each other. If the density in the network is high, this means everyone is connected in a way that nobody can escape the notice of others (Burt, 2000). The more ties, and the stronger the ties between network members, the denser the network. These kinds of networks are also referred to as close networks. The strength of a tie between people is "a () combination of the amount of time, the emotional intensity, the intimacy, and the reciprocal services which characterize the tie" (Granovetter, 1973, p. 1361).

Both of the arguments lead to different predictions about the relationship between network features and social capital. A way to integrate these two opposite views is to look at different

purposes social capital serves: instrumental and expressive actions (Lin, 2008). Van der Gaag and Snijders (2005) distinguished four different dimensions of social capital. I will use the two dimensions that fit best with the two different purposes of social capital. In this way it is possible to integrate the closure and the openness argument, so that I can come up with predictions about the relation between these arguments and the two dimensions of social capital.

2.2. The openness argument

The openness argument emphasizes the positive effects of open networks with more weak ties. This argument starts from the strength of weak ties as Granovetter (1973) put it. He points out that the stronger the tie between two people, the larger the proportion of individuals to whom they are both connected. This results from (1) the tendency of stronger ties to spend more time together; (2) the homophily principle (McPherson, 2001; Lin, 2008); and (3) the theory of cognitive balance (Granovetter, 1973). The homophily principle predicts that there is a strong relation between tie strength and shared sentiment and resources, because people want to connect with people who are like themselves. People who are close to ego are therefore more likely to have the same resources than people who are weakly tied to ego. Weak ties are thus more likely to give access to new resources. The cognitive balance theory predicts that two good friends, A and B, want their feelings to be congruent. If A has a connection with person C and B has not, their feelings are not congruent. This leads to the tendency of B to develop a connection with C, too. From this follows that a triad in which two persons have a strong relationship with each other, and only one of them has a relationship with the third person is very unlikely to occur (Granovetter, 1973). In other words: if two persons have a strong relationship with each other, they are very likely to be both connected with the same third person. What follows from all the above is that the person to whom an individual has a weak tie, is more likely to move in different circles, than a person to whom an individual has a strong tie. This is because the proportion of people to whom the individual and the ego are both connected is larger between the individual and the person with whom he has a strong tie. Granovetter's (1973) point is that the person to whom ego is weakly tied is likely to move in different circles than ego does. In this way, weak ties can serve as opportunities to acquire new information and other resources that a person otherwise would not have had. In a more open network, where not almost all network members are connected, there are more weak ties between people than in close networks. Due to the

larger proportion of weak ties, and the above stated advantages of weak ties, open networks are a source of social capital (Burt, 2000).

For instrumental actions the network strategy is not straightforward, because the purpose here is to obtain additional or new resources (Lin, 2008). Returns of instrumental actions are wealth, power and reputation (Van der Gaag & Snijders, 2005). Whether a close or an open network facilitates this the best depends on the personal resources someone has. For someone who has many personal resources, a close network could be sufficient for mobilizing good resources to find a good job for example, because in this close network may be a lot of people who have many resources too, and who are willing to help. This could apply to people with a high socioeconomic status. For people who possess few personal resources, a close network may not be sufficient to acquire good resources for instrumental actions. This is because it is likely that in the close network of these people are only people who have few resources too. They might in this case be willing to help, but not able to help. People with a low educational level and occupational status might therefore need an open network, with many weak ties, to get access to good resources for instrumental actions. This point is clearly illustrated by Lin (2008), because he states that it depends on (1) the purpose of action and (2) the richness of embedded resources in the network, whether an open or a closed network is the source of social capital. The prediction here is that for people with a high socioeconomic status close networks are sufficient to facilitate necessary resources for instrumental actions, but for people with a low socioeconomic status open networks are needed.

Van der Gaag and Snijders (2005) distinguish a dimension that fits well with Lin's (2008) definition of instrumental purposes. This dimension is called 'prestige and education related social capital'. This dimension includes resources that have often been associated with the 'strength of weak ties' resources of high status persons, mainly with the purpose of instrumental actions (Van der Gaag & Snijders, 2005). By that they found that people with more personal resources have more prestige and education related social capital. From this it is expected that:

- (A) *The denser the network of someone with a low socioeconomic status, the less prestige and education related social capital he/she has; and the denser the network of someone with a high socioeconomic status, the more prestige and education related social capital he/she has*

In the above stated explanation it is argued that the effect of network density on prestige and education related social capital is caused by the lack of heterogeneity of the network members that occurs in a closed network. Network heterogeneity is therefore expected to be the underlying mechanism for the relationship between network density and prestige and education related social capital. To test if network heterogeneity does have an effect on prestige and education related social capital, the differences between people with a high and low socioeconomic status should be taken into account. Network heterogeneity increases the chance that people with a low socioeconomic status have people in their network with a higher socioeconomic status, and therefore increases the chance that they have access to the resources of people with a higher status. For people with a high status network heterogeneity increases the chance of having people with a low status in their network, and therefore decreases the chance of having access to good resources for instrumental action. To test if network heterogeneity could be the underlying mechanism for the relationship between network density and prestige and education related social capital, it is expected that:

- (B) *The more heterogeneity in the network of someone with a low socioeconomic status, the more prestige and education related social capital he/she has; and the more heterogeneity in the network of someone with a high socioeconomic status, the less prestige and education related social capital he/she has.*

2.3 The closure argument

For explaining the closure argument Burt refers to Coleman (1988). He argues that close networks are the source of social capital, because in the first place close and dense networks facilitate sanctions. This makes it less risky for network members to trust each other (Burt, 2000), because people who betray trust can be sanctioned by the other network members. This is possible, because it is likely that all members will know each other and the person who betrayed, so they can act in concert against this particular person. For this reason it is likely that strong social norms and beliefs can exist in close networks. These social norms and benefits are often associated with a degree of closure and encourage compliance with local rules and customs and reduce the need for formal controls (Adler and Kwon, 2002, p. 29). In the second place Coleman (1988) argues that these kinds of networks facilitate access to reliable information.

People can save time if they can get information from their friends, who they can trust, instead of reading the newspaper elaborately every day. Strong ties are also more willing to support or help than weak ties are, because as already stated in Granovetter's (1973) definition of tie strength (see p.3), they involve reciprocal services. In short, the prediction is that a close network facilitates trust between network members, and therefore more reliable communication, and protection against exploitation (Burt, 2000), plus there is more willingness to support. Therefore close networks are a source of social capital.

According to Lin (2008) social capital can serve not only instrumental actions, but also expressive actions. Expressive actions try to "maintain and preserve existing resources" (Lin, 2008, p.13) and "have physical health, mental health and life satisfaction as returns" (Van der Gaag & Snijders, p. 21). Therefore, the network strategy is to connect to people with similar resources and who are willing to help and support to preserve those resources (Lin, 2008). This fits well with the above stated qualities of a closed network, due to the prediction that there is more willingness to support and the homophily prediction that there are more people with similar resources in close networks. From this follows the prediction that close networks will facilitate necessary resources for expressive actions (Lin, 2008).

The dimension of social capital that fits best with the purpose of expressive actions is "personal support social capital". This dimension "is clearly about maintaining continuity in one's personal life" (Van der Gaag & Snijders, 2005, p. 23). This matches with the purpose of expressive actions, namely maintaining existing resources. Thereby Van der Gaag and Snijders (2005) notice that the items in this dimension are generally accessed through stronger ties. For these reasons "personal support social capital" can be seen as a dimension of social capital that is mainly used with the purpose of expressive actions. They also state that the resources in this dimension involve trust, which makes it more likely that they are available in close and dense networks. Therefore I come to the prediction that close networks will facilitate more personal support social capital than open networks.. A testable hypothesis would then be:

- (C) *The denser someone's network, the more personal support social capital he/she has.*

In the above stated explanation it is argued that the effect of network density is caused by the trust that occurs in a closed network. To test this prediction the following hypothesis is formulated:

(D) *The positive effect of network density on personal support social capital is caused by a higher degree of trust in dense networks than in less dense networks.*

3. Data and methods

3.1 Data

In this article data of the first wave of the Survey on the Social Networks of the Dutch (SSND1) is analyzed. These data were collected in 1999-2000 to eventually provide an answer to the research question: To what degree are the differences in social networks and their effects on education level, getting a job and work performances in different institutional contexts the result of differences in returns from social capital, which means the result of differences in returns of goal specific and general social capital, and how was this social capital created? Potential participants were between 18 and 65 years old. They received a letter in which the background of the research project was explained. This letter announced that they would receive a phone call for an appointment. Selected participants without a phone in their possession were visited at home to make an appointment. All the interviews were conducted in the respondents' homes, using a fixed questionnaire, and lasted 1 hour and 50 minutes on average (Van der Gaag & Snijders, 2005). The sample ($N = 1004$) was collected in 40 randomly selected municipalities in the Netherlands. There is an overrepresentation of wage-earners, men, higher educated people and married people in the SSND1 data. The response rate is 40%. This is partly because of not held interviews, due to reaching the desired number of participants.

3.2 Methods

In this paragraph the construction of all the variables used for the analyses are explained. The descriptive statistics of all these variables are presented in table 1.

Social capital variables

The first dimension is prestige and education related social capital. According to Van der Gaag and Snijders (2005) analyses there are six items in the SSND1 dataset which fit in this dimension. All these items were obtained by asking: "Do you know anyone who...". The first item is "has knowledge of literature". This item was measured in four categories: (0) No; (1) a kin; (2) a friend; (3) an acquaintance. The five following items are measured in the same way. Since the purpose of the variable to be constructed is to measure only whether one has access to particular resources, all the items are recoded into a dummy variable. Respondents score 0 on this variable if they do not know anyone who possesses a particular resource and score 1 if they do. The other five items are: "has good contacts with the media"; "owns a holiday home abroad"; "earns more than Dfl. (Dutch currency before 2002) 5000 monthly"; "has graduated senior high school" and "has a higher vocational education". Before constructing a scale variable that measures the total amount of social capital in this dimension a reliability test was conducted by computing Cronbach's alpha. The scale is not as reliable as hoped (Cronbach's $\alpha = .630$). By removing the item "has good contacts with media" the Cronbach's alpha of the scale would increase only to .639. Because this is only a small increase, the item was not removed from the scale. Due to lack of better options the scale for this dimension of social capital was still constructed and used in the further analyses. Another reason to maintain this scale variable is that Van der Gaag and Snijders (2005) identified it as a dimension of social capital. The constructed variable *prestige and education related social capital* equals the sum of the above described dummy variables.

The other dimension to be included in the analyses is personal support social capital. According to Van der Gaag and Snijders (2005) there are four items which fit in this dimension. These items were measured and recoded in the same way as the items in the *prestige and education related social capital* scale. The items are "can give a good reference for a job"; "can give advice about conflict at work"; "can give advice about conflicts with family members" and "can help when moving house (packing, lifting)". After recoding the reliability of the scale was tested by computing Cronbach's alpha. This scale is not as reliable as hoped, too (Cronbach's $\alpha = .546$). By deleting the last mentioned item the reliability would show only a small increase (Cronbach's $\alpha = .552$), so this item is not removed from the scale. The constructed *personal support social capital* scale equals the sum of the above described dummy

variables. For the same reasons as the other scale variable of social capital the *personal support social capital* scale will be used in the further analysis, despite the relatively low reliability of the scale.

Network density variables

For six of the respondent's network members chartered through the name generator questions it was asked to what extent they knew each other. One of the mentioned alters is left out of the analyses for the purpose of this article, because this is someone with whom the respondent has a negative relationship. The reasoning behind this is that a negative relation is not willing to provide any useful resources, so this relationship will not contribute to the respondent's social capital. The alter network therefore consists of a maximum of 5 persons in this measure. Alter number 1 was mentioned by the respondent as an answer to the question: *If you have a problem at work, to whom do you go for advice and counsel?* The respondents had to mention the first name and the first letter of the last name of at most five persons. The person that was mentioned first as an answer to the above question is alter number 1. Alter number 2 is the first person mentioned (if not mentioned at an earlier name generator question) as an answer to the question: *Are there people who come to you for counsel and advice if they have problems regarding their work?* Alter 3 is the first person mentioned (if not mentioned at an earlier name generator question) as an answer to the question: *If you are busy with a job in or around the house for which you need someone who lends a hand, for example for lifting furniture or holding a ladder, who do you ask for help?* Alter 4 is the first person mentioned (if not mentioned at an earlier name generator question) as an answer to the question: *Is there someone, who does not belong to your household, who has the key to your house?* Alter 5 is the first person mentioned (if not mentioned at an earlier name generator question) as an answer to the question: *With whom did you discuss important personal matters in the previous half year?* After collecting the names of these alters, the question was asked: *how good do person 1 and person 2 know each other?* This question was asked for all the possible combinations of two alters. The answer categories were: (1) Persons avoid each other; (2) persons do not know each other; (3) Persons barely know each other; (4) Persons know each other well; (5) Persons know each other well and like each other. Since these answer categories are not mutually exclusive, because persons could know each other well and still avoid each other for example, these items were recoded. The answer

categories 1 and 2 were recoded as 0 –no positive relationshipø The categories 3, 4 and 5 were recoded as 1 –people do have a positive relationshipø The second reason for this recoding is that network density is equal to the number of relationships in a given network divided by the maximum number of relationships in that network. Therefore information about strength of the relationship is not needed and category 3, 4 and 5 can be grouped as one. For all five alters a dummy variable was computed, which indicates either this alter was (1) or was not (0) mentioned. The respondent scores 0 on the variable *alter1* if all the possible relationships between alter 1 and the other alters were missing, because this means that alter 1 was not mentioned. The same goes for the variables *alter2*, *alter3*, *alter4* and *alter5*. The sum of these variables equals the computed variable *number of alters*. This variable determines the maximum number of ties in the alter network for every respondent. If a respondent scores 1 on *number of alters* there are 0 possible ties and the respondent eventually scores a missing value on network density. If *number of alters* is 2, the *maximum number of ties* is 1. If it is 3, the maximum number of ties is 3. If it is 4, the maximum number of ties is 6 and if it is 5, the maximum number of ties is 10. At this point it is possible to compute the variable *Network density1* = *number of alter ties* / *maximum number of alter ties*.

The second network density variable consists of different items. These items show to what the degree the respondent agrees with the following five statements: (1) *Most of my friends know each other*; (2) *My good friends do also know my family*; (3) *At work I meet very different people compared to the people I meet during my leisure time*; (4) *My neighbours visit my birthday parties*; and (5) *My colleagues visit my birthday parties*. The answer categories were: (1) Strongly disagree; (2) Disagree; (3) Agree; and (4) Strongly agree. All of these items were recoded by subtracting with 1 point. In this way the items have a valid minimum value of 0 and a maximum value of 3, which makes it easier to interpret in a regression analysis. Before constructing a scale for network density out of these items an exploratory factor analysis was performed to see if there are multiple underlying dimensions. In social sciences some correlation among factors is generally expected, therefore use of orthogonal rotation results in a loss of valuable information if the factors are correlated (Costello & Osborne, 2005). For this reason the promax rotation method is used. The results show that there are two factors with an eigenvalue of respectively 1.450 and 1.281. Both factors together contribute for 54.6 percent of the total variance in the items. This indicates that there are two underlying factors in this set of items. The

item *My good friends do also know my family* ($r = .622$) correlates best with factor 1. The item *Most of my friends do know each other* ($r = .594$) correlates with factor 1, too. *My colleagues come to my birthday party* ($r = .504$) fits best in the second dimension. *I meet other people at work than at leisure time* ($r = .384$) and *My neighbours come to my birthday party* ($r = .347$) fit in this dimension too. The correlations in this dimension are weaker than in the first dimension. For the items in this second dimension a reliability test was conducted to investigate if these items could form a reliable scale variable. The conclusion of this test is that these items do not form a reliable scale (Cronbach's $\alpha = .360$). The reliability did not increase if one of the items was deleted. For this reason these items cannot be used in the further analysis. The two items in the first dimension do form a more reliable scale (Cronbach's $\alpha = .534$), but this is also not as reliable as hoped. The items *My good friends do also know my family* and *Most of my friends do know each other* are theoretically clear indicators of network density, and there are no other reliable items available. Therefore the scale variable *Network density2* equals the mean of these items. Respondents only get a valid score on this variable if none of the two items had a missing value.

The Pearson correlation coefficient shows a weak positive correlation between both network density measures ($r = .166$). This means that both concepts do not measure entirely the same concept. *Network density1* measures the density of a specific part of the respondent's network, including at most five network members, who all help the respondent in a particular way. The choice for these particular five alters was made by the researchers and not by the respondent. *Network density2* leaves more room for interpretation to the respondent. For example, *Most of my friends do know each other*, leaves room for the respondent to think about who he himself sees as his good friends. This is not the case with the items of *Network density1*, where the respondent has to comment on specific relations between given alters. *Network density2* therefore measures the density of a wider part of the respondent's total network than *Network density1* does. Therefore *Network density2* will be called from now on *Wider network density*. Since the given alters for *Network density1* are, given the sort of help they provide for the respondent, expected to be relatively close to the respondent, this dimension of network density will be called from now on *Core network density*.

An interaction variable is computed for both network measures and *education in years*. Before both interaction variables were computed, all three variables were standardized to solve the problem of multicollinearity.

Education heterogeneity

To construct a measure for ego-alter heterogeneity for education level, information about the education level of the respondent and the alters can be used. Only the information about the alters from the *core network* are used. Respondents were asked about the education level of all the alters they had mentioned. They could answer in four categories: (1) Primary school; (2) Higher general education, pre-university (MAVO, VWO); (3) Higher vocational education (MBO/HBO); and (4) University. It is not possible to recode the education level of the alters into years of education, because education levels with different lengths in years are grouped into the same category (for example MAVO and VWO). In this way there is no information about which alter completed which specific education. For a proper comparison the education level of ego was recoded into the same four categories. The *education heterogeneity* variable is equal to the absolute difference between the education of the respondent and the average education of the alters. To test the interaction effect of education heterogeneity and education in years on prestige and education related social capital an interaction variable was constructed. Before constructing this interaction variable, the items were standardized to solve the problem of multicollinearity.

Ego-alter trust

To measure the degree of trust in the respondent's network there is a set of items that indicates to what degree the respondent trusts every mentioned alter. Only the trust items about the five alters, who form the above mentioned *core network*, are used to construct an average trust variable, because in this way the information about network density and trust relate to the same alter network. Respondents had to indicate to what degree they trust the mentioned alters. They had to choose from the answer categories 1, 2, 3, 4 and 5, where 1 means that the respondent does not trust the alter, and 5 means that the respondent strongly trusts the alter. These items were recoded by subtracting with one point, since it is easier to interpret a variable in a regression analysis if 0 is a valid minimum score. In this way the scale ranges from 0 (no trust) till 4 (strong trust). The mean of the five items about the five mentioned alters equals the

variable *Core network trust*. Respondents only get a valid score on this variable if they have at least 3 out of 5 valid scores in the ego-alter trust items.

Control variables

Occupational prestige. The name of the occupation of the respondent was asked, which was translated into an occupational prestige value, according to the Ultee & Sixma occupations ranking (Ultee & Sixma, 1983). This is an interval level scale variable, which was already available in the dataset.

Occupational prestige of the father. The occupation name of the father at the time the respondent was 16 years old was asked and translated in an occupational prestige value like explained in the above section. This variable is used, because "higher occupational status of one's father, together with better human capital, facilitates access to high-prestige contact persons" (Völker & Flap, 1999, p. 18).

Education in years. The respondent was asked: "What is your highest completed education?" There were 8 answer categories. In this situation the differences between two consecutive education levels was 1 point. To allow some more variance between different levels of education, the categories were recoded into years of education. In this way the differences between the highest and lowest categories, but especially between the lowest categories, became bigger. The resulting categories, with corresponding years of education between parentheses, are: Primary education (8 years in total); Lower vocational education (12); Lower general secondary (12); General secondary (13); Pre-university education (14); Intermediate vocational education (16), High vocational education (17); and University degree (18.5). University degree was recoded as 18.5 years, because of the possibility that a university degree could be either a bachelor degree (18 years) or a master degree (about 19 years).

Male. A dummy variable was constructed for gender, called "male" on which male respondents score 1 and female respondents score 0.

Age. Age of respondents is computed by taking the difference between the year the survey was held and the year of birth of the respondent.

Before conducting the analyses the data was filtered, so that the number of valid cases is equal for all regression models. The descriptive statistics for all variables, after filtering the data, are presented in table 1. Before going on to the regression analyses, the group of respondents

included in the analyses is compared to the complete SSND dataset on average age, occupational prestige, education in years and the percentage of male respondents. In this way it is possible to see if the selected sample differs significantly from the original dataset. The mean age ($M = 43.06$, $S.D. = 10.285$) in the selected sample is 2.13 years lower than in the complete dataset ($M = 45.18$, $S.D. = 11.16$). This means the selected respondents are significantly younger ($T = -4.859$, $p < .001$). The occupational prestige of these respondents ($M = 53.43$, $S.D. = 15.281$) is significantly higher ($T = 4.737$, $p < 0.001$) than the mean occupational prestige of the complete dataset ($M = 50.35$, $S.D. = 16.726$). Education in years ($M = 15.735$, $S.D. = 2.365$) of this sample is also significantly higher ($T = 6.947$, $p < .001$) than in the complete dataset ($M = 15.04$, $S.D. = 2.722$). The proportion of male respondents (.607) is also significantly higher in the sample ($p = 0.091$), compared to the complete dataset (.578).

All above mentioned variables will be used to test the hypotheses using linear regression analysis. The various model and according results will be explained in the next paragraph.

Table 1. Descriptive statistics of all variables (N = 552)

	Minimum	Maximum	Mean	S.D.
Prestige and education social capital	0.00	6.00	4.29	1.238
Personal support social capital	0.00	4.00	3.48	0.803
Core network density	0.10	1.00	0.54	0.213
Wider network density	0.00	3.00	1.99	0.533
Core network trust	2.40	5.00	4.44	0.503
Education heterogeneity	0.00	2.00	.56	0.456
Education heterogeneity * education	-6.54	3.36	0.020	0.959
Wider network density * education	-2.63	2.32	-0.535	0.794
Core network density * education	-5.60	4.06	-0.081	0.907
Occupational prestige	15.00	86.00	53.43	15.281
Occupational prestige father when 16	15.00	86.00	49.03	17.494
Years of education	8.00	18.50	15.73	2.365
Age	18.00	65.00	43.06	10.285
Male	0.00	1.00	0.61	-

Source: Völker, B., & Flap, H. (2000). Dataset. *Survey on the Social Networks of the Dutch*.

4. Results

Prestige and education related social capital and core network density

For testing the interaction effect of network density and education on prestige and education related social capital the regression models 1.1 and 1.2 were constructed.

In model 1.1 the explanatory variable is *core network density*. The model explains 11.7 percent of total variance in *prestige and education related social capital* ($F=12.040$, $p < .001$). *Core network density* ($B = 0.254$, $p = .280$) does not have a significant effect on *prestige and education related social capital* in model 1.1. *Education in years* ($B = 0.076$, $p = .002$) does have a significant positive effect. *Male* ($B = -0.012$, $p = .910$) does not have a significant effect on *prestige and education related social capital*, which means that there is no significant difference between man and woman. *Occupational prestige* ($B = 0.011$, $p = .003$) and *occupational prestige father* ($B = 0.013$, $p < .001$) and *age* ($B = 0.011$, $p = .029$) do have a significant positive effect on *prestige and education related social capital*.

In model 1.2 the interaction variable is added. In this way it can be tested if there is an interaction effect of core network density and education in years. The new model explains 11.8 percent of total variance. Adding the interaction variable did not result in an improved model (F change = 0.232, $p = .630$). The interaction variable ($B = -0.028$) does not have an effect on *prestige and education related social capital*. *Occupational prestige*, *occupational prestige father*, *age* and *education in years* do still have a significant effect. The other variables do again not have a significant effect.

Education heterogeneity is added to model 1.3. The interaction variable is only later added in model 1.4 to see if adding this variable will improve the model. Adding *education heterogeneity* results in a significant higher explained variance (F -change = 5.731, $p = .017$), so that model 1.3 explains 12.7 percent of the variance in *prestige and education related social capital*. *Education heterogeneity* ($B = -0.264$, $p = 0.017$) has a small negative effect.

In model 1.4 the interaction variable of *education heterogeneity* and *education in years* is added. This results in an improvement of the model (F -change = 6,706, $p = .010$) and 13.8 percent of total variance is explained. The interaction variable ($B = -0.142$) does have an effect on *prestige and education related social capital*. This means that the effect of *education heterogeneity* decreases with 0.113 point when education increases with one year. *Occupational prestige*, *occupational prestige father*, *age* and *education in years* again do have an effect.

Table 2. OLS regression: the effect of core network density and education heterogeneity on prestige and education related social capital

Model	1.1		1.2		1.3		1.4	
	B	SE	B	SE	B	SE	B	SE
<i>Control variables</i>								
Male	-0.012	-	0.011	-	0.022	-	0.046	-
Age	0.011*	0.005	0.011*	0.005	0.010*	0.005	0.010*	0.005
Occupational prestige	0.011*	0.004	0.011*	0.004	0.011*	0.004	0.010*	0.004
Occupational prestige father	0.013*	0.003	0.013*	0.003	0.013*	0.003	0.012*	0.003
Education years	0.076*	0.024	0.077*	0.024	0.079*	0.024	0.091*	0.024
<i>Explanatory variables</i>								
Core network density	0.254	0.235	0.289	0.246	0.310	0.245	0.305	0.244
Core network density x education			-0.027	0.058	-0.033	0.057	-0.034	0.057
Education heterogeneity					-0.265*	0.111	-0.187*	0.114
Heterogeneity x education							-0.142*	0.055
Constant	1.284	0.446	1.253	0.451	1.356	0.451	1.219	0.452
R ²		0.117		0.118		0.127		0.138

* Significant effect (p < .05)

N = 552

Source: Völker, B., & Flap, H. (2000). Dataset. *Survey on the Social Networks of the Dutch*.

Prestige and education related social capital and wider network density

In the regression models 2.1 and 2.2 the effect of *wider network density* on *prestige and education related social capital* is tested. The rest of the models are the same as models 1.1 and 1.2. The results are presented in table 3. In model 2.1 *wider network density* ($B = 0.056$, $p = .551$) does not have a significant effect on *prestige and education related social capital*. The same goes for *male* ($B = -0.016$, $p = .880$). *Education in years* ($B = 0.074$, $p = .002$), *age* ($B = 0.011$, $p = .025$), *occupational prestige* ($B = 0.011$, $p = .003$) and *occupational prestige father* ($B = 0.013$, $p < .001$) have a positive significant effect.

In model 2.2 the interaction variable is added. This variable does not significantly improve the model ($F\text{-change} = 0.832$, $p = .362$) and does not have a significant effect ($B = 0.063$, $p = .362$) on *prestige and education related social capital*. The model therefore does not support hypothesis A. *Wider network density* ($B = 0.019$, $p = .857$), and *male* ($B = -0.022$, $p = .834$) again do not have an effect. *Occupational prestige father* ($B = 0.013$, $p < .001$) does have the largest positive effect, followed by *education in years* ($B = 0.074$, $p = .002$), *occupational prestige* ($B = 0.011$, $p = .003$) and *age* ($B = 0.011$, $p = .024$).

Table 3. OLS regression: the effect of wider network density on prestige and education related social capital

Model	2.1		2.2	
	B	SE	B	SE
<i>Control variables</i>				
Male	-0.016	-	- 0.022	-
Age	0.011*	0.005	0.011*	0.005
Occupational prestige	0.011*	0.004	0.011*	0.004
Occupational prestige father	0.013*	0.003	0.013*	0.003
Education years	0.074*	0.024	0.074	0.024
<i>Explanatory variables</i>				
Wider network density	0.056	0.094	0.019	0.103
Wider network density x education			0.063	0.069
Constant	1.249	0.611	1.311	0.614
R ²		0.116		0.117

* Significant effect ($p < .05$)

N = 552

Source: Völker, B., & Flap, H. (2000). Dataset. *Survey on the Social Networks of the Dutch*.

Personal support social capital and core network density

The effects of core network density and core network trust on *social support social capital* are tested in model 3. First control variables are included in model 3.1. In model 3.2 *core network density* is added. In model 3.3 *core network trust* is added. Model 3.1 explains only 1.7 percent of total variance in *personal support social capital*. The only variable that has a significant effect is *occupational prestige* ($B = 0.004$, $p = 0.097$). Model 3.2 explains 1.8 percent of variance. *Core network density* ($B = 0.089$, $p = .581$) does not have a significant effect and after adding this variable the model does not significantly improve (F -change = 0.305, $p = .581$). Model 3.3 explains 2.2 percent. This is again not a significant improvement (F -change = 2.520, $p = .113$). *Core network trust* ($B = .110$, $p = .113$) does not have an effect on *personal support social capital*.

Table 4. OLS regression on personal support social capital

Model	3.1		3.2		3.3	
<i>Control variables</i>	B	SE	B	SE	B	SE
Male	-0.054	-	-0.054	-	-0.048	-
Age	-0.004	0.003	-0.004	0.003	-0.005	0.003
Occupational prestige	0.004*	0.003	0.004*	0.003	0.004*	0.003
Occupational prestige father	0.000	0.002	0.000	0.002	0.001	0.002
Education years	0.015	0.016	0.014	0.016	0.015	0.016
<i>Explanatory variables</i>						
Core network density			-0.136	0.163	-0.136	0.163
Core network trust					0.110	0.069
Constant	3.262	0.397	3.312	0.408	2.830	0.508
R ²		0.017		0.018		0.022

*Significant effect (p < .1) * Significant effect (p < .05)

Dependent variable: personal support social capital | N = 552

Source: Völker, B., & Flap, H. (2000). Dataset. *Survey on the Social Networks of the Dutch*.

Personal support social capital and wider network density

Model 4 test the effect of *wider network density* on *personal support social capital*. The rest of models 4.1 and 4.2 are the same as 3.1 and 3.2. Model 4.1 explains only 1.7 percent of total variance in *personal support social capital*. *Occupational prestige* (B = 0.004, p = 0.097) is the only variable that has a significant effect. In model 4.2 *wider network density* is added. This does not significantly improve the model (F-change = 0.394, p = .530) and model 4.2 explains only 1.8 percent of total variance. *Wider network density* (B = 0.040, p = .530) does not have a significant effect on *personal support social capital*. Again *occupational prestige* is the only variable that has a small significant effect (B = 0.004, p = .091).

Table 5. OLS regression on personal support social capital

Model	4.1		4.2	
	B	SE	B	SE
<i>Control variables</i>				
Male	-0.054	-	-0.056	-
Age	-0.004	0.003	-0.004	0.003
Occupational prestige	0.004*	0.003	0.004*	0.003
Occupational prestige father	0.000	0.002	0.000	0.002
Education years	0.015	0.016	0.015	0.016
<i>Explanatory variables</i>				
Wider network density			0.040	0.064
Constant	3.262	0.397	3.182	0.417
R ²		0.017		0.018

*Significant effect (p < .1) * Significant effect (p < .05)

Dependent variable: personal support social capital | N = 552

Source: Völker, B., & Flap, H. (2000). Dataset. *Survey on the Social Networks of the Dutch*.

5. Conclusion

In this article the relationship between network closure and two specific dimensions of social capital is examined. The main purpose of the article was to investigate whether these relations exist, and the second was to test the underlying mechanisms of these possible relationships, by controlling for heterogeneity and trust. This distinguishes this paper from articles in which is mainly focused on the outcomes of social network characteristics or social capital, such as income, occupational prestige or life satisfaction. The research question that this article tried to answer is: is there a relationship between network closure and specific dimensions of social capital? And what are the underlying mechanisms of these relationships?

The hypotheses come from two different, but complementary, theoretical frameworks, which I labelled the openness and the closure argument. These were integrated by distinguishing between instrumental and expressive purposes of social capital. Where instrumental actions try to obtain additional resources and the returns are wealth, power and reputation, the purpose of expressive actions is to maintain and preserve existing resources and the returns are mental and physical health and life satisfaction. In this article,

distinguishing between these two purposes of social capital was made possible by using the dimensions *prestige and education related social capital* and *personal support social capital*.

From the openness argument I deducted the expectation that people with a low socioeconomic status need an open network to obtain prestige and education related social capital, whereas people with a high socioeconomic status need a closer network. This hypotheses was not supported. I also predicted that the underlying mechanism for the possible relationship between network density and prestige and education related social capital was caused by network heterogeneity, and that there would be a positive effect of network heterogeneity for lower educated people and a negative effect for higher educated people. This hypothesis was also not supported. Network heterogeneity was found to have a negative effect on prestige and education related social capital. There was an interaction effect of heterogeneity and education found, though, because the effect of network heterogeneity turns out to be less negative for lower educated people than for higher educated people, but this can not be regarded as an underlying mechanism for the relationship between density and social capital, as the hypothesis predicted.

From the closure argument I predicted that a dense network has a positive effect on personal support social capital. This hypothesis was not supported. Thereby I predicted that the underlying mechanism for the possible relationship between network density and personal support social capital is trust in network members. There was also no evidence found for this hypothesis.

Another conclusion from these analyses is that socioeconomic background characteristics, like occupational prestige, education level and occupational prestige from the father, have an effect on one's prestige and education related social capital. This is in line with the conclusion of Völker and Flap (1999, p.18) that "higher occupational status of one's father together with better own human capital facilitates access to high-prestige contact persons". Access to high prestige contact persons can be understood as an indicator of *prestige and education related social capital*. There were no controlling analyses for selection effects in this article, so it is not sure what the causal order in the relationship between the respondent's occupational prestige and prestige and education related social capital is. It could be that people with more social capital achieve a higher occupational prestige, but it could also be that people in high status jobs achieve more social capital through their work.

6. Discussion

The above stated conclusions have to be interpreted with care, due to various limitations of the social capital and network density measures. It is possible that the hypothesis about the relationship between network density and prestige and education related social capital was not supported, because of the somewhat low reliability of the prestige and education related social capital variable. Low reliability is even a bigger limitation in the analyses of the relationship between network density and personal support social capital. The low reliability of the *personal support social capital* dimension could be caused by the high popularity of items in this dimension, as Van de Gaag and Snijders (2005) already stated. This means that there is a skewed distribution in the accessibility of the personal support resources. *Prestige and education related social capital* items were less popular and this could therefore be a more useful dimension. Both regression models with *personal support social capital* as dependent variable could only explain a very small proportion of the variance, which indicates that these regression models were not useful.

Both network measures used in this article have their own weaknesses. The *core network density* variable is constructed from data on relations between alters, who were not chosen by the respondent himself, but by the researchers. It is possible that the alters that the respondent would have chosen are completely different from the alters selected by the researcher and therefore this measure may not be a proper indication of the core network of the respondent

The *wider network density* measure also has its weaknesses. An item like *“most of my friends know each other”* asks a lot of own interpretation of the respondent. Some respondents will therefore overestimate this item if they only think about their good friends, because there is a big chance that they do know each other. Respondents could also underestimate this item if they see people with whom they have a weaker connection also as friend, because the chance that they do know each other is less. Thereby knowing each other can be interpreted as having heard of the other person via the respondent, but it can also be interpreted as having a connection to this other person. Due to the different interpretation possibilities of this particular question it could be that respondents interpreted it differently than other respondents and therefore it is not clear what an answer to this question really means for a particular respondent.

Besides the implications of the above mentioned limitations of the data, it could also be possible that there are other mechanisms at play than the ones I expected. The results now indicate that socioeconomic background characteristics are way more important for access to

social capital than network density. It is also possible that it is not so much the density of the network that determines access to social capital, but that it is just being connected to one or a few people who possess the necessary resources. Whether a network is dense or open, may be separate from being connected to one or a few particular persons that can give you personal support for example. For the particular items that were measured as indicators of social capital, it could be true that people generally only need one or two network members to obtain this resource, and that network density does not influence this. This could be particularly true for the items in the personal support social capital dimension, given the high popularity of these items. For this reason, having a partner, having strong family ties, or having one or two close friends may be more important for obtaining personal support social capital, than having a dense core network. The effect of the occupational status of the father on access to prestige and education related social capital has to be carefully interpreted, because status of the father can already be seen as prestige and education related social capital itself. Therefore, it is possible occupational status of the father is also included in the prestige and education related social capital measure for some respondents. This might partly explain the positive effect of the status of the father. Another possibly important factor, that was not included in the analysis, is the size of the wider network of the respondents. This network size may be particularly relevant for obtaining prestige and education related social capital, especially now the analyses showed that heterogeneity has an effect on this dimension. Namely, an increase of network size could enlarge the chance that there are more network members with other education levels than ego.

Furthermore, various characteristics of the alters are available in the dataset, but were not included in the analyses, as gender, age, *religion* and occupational status. These characteristics of the alters might have an effect on ego's social capital though, and it could be that possibly important effects were overseen by not including them. The same goes for various characteristics of the tie between ego and the alters, like intensity of the relationship, geographical distance between ego and alter and contact frequency.

Suggestions for further research

In further research it is important to measure network density and the dimensions of social capital in a more reliable way. Because Van der Gaag and Snijders (2005) distinguished these dimensions out of the SSND dataset, in further research it could be helpful to be aware of these dimension before gathering the data. In this way it is possible to measure the different

dimensions separately and thereby think of more items and more rarely accessed items in the personal support social capital dimension to allow more variance in this measure.

Core network density could also be measured in a different way in future research. If the respondent would have had the opportunity to name five or most preferably more alters, who he or she thinks form his or her personal core network, the density in this network would have been a better measure to test the theoretical assumptions in this article. For measuring wider network density it could be an improvement if the questions that are asked are more narrowly defined. Knowing each other could be specified by the interviewer to make sure that all respondents interpret the question in the same way. It could be specified as having a personal connection with each other, for example. A personal connection can be defined as seeing each other every week or month, for example. This leaves less room for interpretation for the respondent and could lead to more easily interpretable answers.

If core network density and wider network density are measured with the above suggestions, it would be an interesting research topic to examine if there are different relationships between social capital and core network density, and social capital and wider network density. Thereby it could be interesting to examine if, for example, core network density has a larger effect on personal support social capital than on prestige and education related social capital, and if the opposite is true for wider network density. In further research it would also be useful to include the size of the wider network in the analyses, particularly for the effect on prestige and education related social capital. The relationship between network density and mobilized social capital need further research, too, because in this article only attention was paid to accessed social capital, and it is possible that there are differences between these two. There could be a difference between mobilized social capital in close and open network, due to differences in willingness to support, for example. As already mentioned in the discussion, various characteristics of the alters and of the relationship between ego and the alters were not included in the analyses, but including them might be an improvement in further research on explaining access to social capital.

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