Social Networks and Health

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Sociale netwerken en gezondheid
(met een samenvatting in het Nederlands)

Proefschrift

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Contents

1. Introduction

This study concerns the mutual relationships between a person's social network[1] and his or her[2] health. We investigate whether it is true that the people around a person influence his health, and the reverse, whether it is true that health influences the (number and kind of) people he is (still) in contact with. The next question is, provided that such relationships do exist, why these relationships exist. What is it about the social network that influences the health of people, and in what way does health status influence social contacts? Although quite a large amount of research has been done on the relationships between characteristics of personal social networks and health, our study contributes to a greater understanding of these relationships because of two important characteristics: 1) the diversity of our data, 2) the integration of three different explanatory mechanisms for the relationships between social networks and health with the help of one key idea.

In general, research on characteristics of social networks in the Netherlands concentrated on specific groups of persons. Outside the Netherlands, studies on social networks and health primarily focused on specific types of network characteristics, or on very specific types of health indicators. Our data contains a diverse range of characteristics, of the social networks as well as of health, of a representative sample of the Dutch. The data we have to our disposal were collected as part of the "National Study of Morbidity and Interventions in General Practice" by means of health interviews (Foets, Van der Velden and De Bakker 1992). A number of questions in the interview concern health status and characteristics of social networks. Over 17,000 respondents were randomly selected from the administration of 161 general practitioners. Since nearly all inhabitants of the Netherlands are registered with a general practitioner and since the sample is quite similar to the Dutch population in several respects (Foets and Van der Velden 1990), this sample is representative. Since there were no network data available on a representative sample in the Netherlands so far, we begin this study with an investigation into the social networks of the Dutch (**chapter 2**). More specifically, research on relationships between social networks and health has been limited in our country to specific groups of patients. Accordingly, we describe relationships between characteristics of social networks and health for our representative sample in **chapter 3**.

Mechanisms in the relationship between social networks and health have rarely been the focus of study. Uptill now, two hypotheses have been under study, but the mechanisms behind these proposed relationships have remained unclear. A first

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[1] Social networks in this study are limited to what Mitchell (1974) calls ego-centred personal networks. These networks include all the relations a particular person has with other persons.

[2] Although many of our respondents are female, we usually refer to them as if they were all male, with no other objective than to make the text easier to read.

hypothesis is that health is enhanced through social support received from members of the social network. The receipt of social support is supposed to protect people from the negative consequences of stress (the "buffer" effect). A second hypothesis is that social relations affect health irrespective of the level of stress (the "direct" effect). That both effects exist is shown (see for reviews, Cohen and Wills, Israel and Rounds, Van Sonderen 1991). These studies demonstrate that buffer effects are found when support is measured by the availability of resources that help in the response to stressful events, while direct effects tend to be found when measures of integration (the existence of relations) are investigated. This already suggests that specific characteristics of the social network may have different effects on health. Still, it does not tell us why social support may buffer stress, or why having a certain number of specific relations may affect health. Both hypotheses mentioned concern effects of social networks on health. The reverse mechanism in the relationship between social networks and health has also been studied already, although less often: the effect of health status on the existing social network (Janssen 1992). Why social network characteristics and health are related is the subject of the chapters 4 to 7. Several answers to this question are formulated with the help of the theory of social capital. This theory views social networks as social resources. The theory of social capital assumes that people differ in the amount of available social resources. These resources can be used (whether or not deliberately) to achieve goals (for instance, health). With the help of this theory we are able to indicate three mechanisms by which social networks and health are related: 1) social regulation of health behaviour; 2) buffer effects of social support; and 3) changes in the social network through changing investment in each other caused by illness or impairment. In **chapter 4** we go into the theory behind these three mechanisms and review research literature that has dealt with each of these mechanisms along the line of our theory.

The description of relationships between characteristics of social networks and health for our whole sample in chapter 3 does not reveal which of the mechanisms can be held responsible in whatever demonstrated relationship. By selecting specific groups of respondents we investigate each mechanism in chapters 5 through 7. In **chapter 5** we empirically investigate the mechanism of social regulation. We assume, on the basis of the theory of social capital, that a person in a closely-knit (dense) network will conform more closely to the norms of the network than a person in a less dense network. If norms in a network are not health-endangering or even health-promoting and the network is dense, this person will be in better health.

A further assumption of this theory is that the social resources one has access to are often goal-specific. Not every person in the social network is equipped to provide support in every situation. Related to this is the concept of goal-specific social support; not every type of support is adequate in every situation. This is what the buffer effect is about: consequences (like getting ill) of specific kinds of events are buffered by specific kinds of social support. Characteristics of events and types of support have to match for buffering to occur. In **chapter 6** we show results of testing this effect empirically.

The next chapter deals with a reversed pathway: selection in the social network through illness or impairments. When someone develops an illness or impairment, opportunities to continue shared activities with others will become limited because of limitations in functioning. On grounds of the theory of social capital, we hypothesize that the social network will deteriorate the longer the illness lasts. The part of the social network that lasts will be a dense core consisting of long-standing, multiplex relations with people who have more time available and live nearby. In **chapter 7** we test these hypotheses on selection.

Chapter 8 provides a summary of the major findings of this study and some theoretical and methodological considerations.

Chapters 2 through 7 were written as articles, all in collaboration with Henk Flap, Marleen Foets and Peter Groenewegen. Chapter 2, on social networks of the Dutch, was partly published in the Dutch journal *Mens en Maatschappij* in 1992. This chapter was also published in a Dutch book on social networks and their influence (Jansen and Van den Wittenboer 1992). The descriptive chapter on characteristics of social networks and health (chapter 3) has been submitted in dutch to *Tijdschrift voor Sociale Gezondheidszorg*. The next four chapters (4 through 7) on the theoretical and empirical exploration of mechanisms in the relationship between social networks and health, have been submitted all to *Social Science and Medicine*. Since the chapters 2 through 7 were written as articles, to be read separately, parts of these articles overlap (e.g., data and measurements).

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2. Networks in the Netherlands.
A study of personal networks of the Dutch

2.1. Introduction

The general increase in the number of network studies is also noticeable in the Netherlands. Most research in the area of social networks is directed at what are called ego-centred or personal networks, which include all of the relations that a particular actor has with other actors and, in some cases, the relations between these other actors as well (Mitchell 1974). Examples of Dutch research into personal networks concern the relationships between specific network characteristics and factors such as well-being and loneliness (Knipscheer 1980, Danz 1981, De Jong-Gierveld 1984, Van Tilburg 1988, Dykstra 1990), position in the labour market (De Graaf and Flap 1988, Boxman, De Graaf and Flap 1991), health behaviour (Mootz 1981, Franssen and Knipscheer 1990, Hüttner, Franssen and Persoon 1990, Mootz 1990), social control (Nauta 1973), and social support received after divorce (Oosterbaan and Zeldenrust 1985). A recent review of Dutch research into personal networks is given by Knipscheer and Antonucci (1990).

The objective of research into networks generally is to determine how network characteristics influence the behaviour of people in the network (Dykstra 1990). How networks are built and how they change (Broese Van Groenou 1991) has been investigated less frequently. Research into personal networks usually focuses on specific problems in relation to particular population groups, such as the elderly, the divorced, the chronically ill, the unemployed, etc. As soon as an attempt is made to generalize about the relationships between network characteristics and people's behaviour, the question arises as to what extent the networks of specific population groups deviate from the networks of a "cross-section" of the population. Thus far, no point of reference has been given to indicate on what characteristics and to what extent the networks studied deviate from networks in the Dutch population as a whole. The purpose of the present contribution is to change this state of affairs. Accordingly, the question is: *What are the personal networks of the Dutch like?*

Thus far, we have spoken about personal networks in an undifferentiated way. Empirical research into the relations between actors is made using three different approaches: the *social integration approach*, the *social support approach* and the *social network approach* (House and Kahn 1985, Dykstra 1990, Knipscheer and Antonucci 1990). These approaches focus on different characteristics of social relations. The social integration approach uses individual characteristics such as marital status and the presence of friends as indicators of the degree to which people are integrated into society. This type of research is limited to establishing the presence or absence of particular types of personal relations (Berkman and Syme 1979). Researchers who use the social support approach see the quality of these social relations as the central issue.

In their view, the quality of a relation is to be determined by the amount and type of support that the relation provides, in other words, by the function which the social relation has for the individual (Cohen and Syme 1985, Sarason and Sarason 1985). The social network approach uses characteristics of the respondent's network as indicators of the structure of the network itself (Fischer 1982a, Marsden 1987). Examples of such network characteristics are the density and heterogeneity of the network in terms of gender and social status. Given these approaches, the question can be further refined: *How are the characteristics of social integration distributed throughout the Dutch population? How are the characteristics of social support distributed throughout the Dutch population? How are the structural characteristics of the social network distributed throughout the Dutch population?*

In this chapter we shall present results which can be used as a benchmark for research on the basis of the above approaches. We first describe the composition and size of the household, the number of "true" friends, membership of organizations, frequency of church-attendance, and having work outside the household. These are characteristics which are used in the social integration approach. Secondly, we shall present data on the support that the networks provide. Finally, results will be presented on the structural characteristics of the networks: the proportion of kin, heterogeneity in terms of gender and labour market participation. To conclude the discussion, a comparison will be made with the characteristics of social networks established in research on specific groups.

2.2. The operationalization of networks

Various methods are available to make networks visible. The most common procedure for measuring personal networks is by means of a survey. Three methods have been developed to delineate the personal networks of respondents in a survey. These are 1) the role method, 2) the affective method and 3) the exchange method (McCallister and Fischer 1978). The relative adequacy of these methods depends on the questions posed in the research. The *role method* involves questions designed to produce names of people who play particular roles in the respondent's life (kin, friends, neighbours, etc.). A disadvantage of this method is that people have a different understanding of the word "friend" in different social groups (Burt 1991). When people are asked to mention the names of people with whom they have a close relation or people who are important for them, then we are concerned with the *affective method.* The disadvantage of this method is that not everyone uses the same criteria in judging the closeness or the importance of a social relation.

An improvement in the measurement of personal networks was made by Fischer (McCallister and Fischer 1978, Fischer 1982a). He formulated questions for what is called the *exchange method.* Using particular types of interactions, the names of network-members are generated. Examples of such questions are: "Whom do you talk to about personal problems?" and "Who looks after your house when you are away for a longer period of time?". Then the importance of the names is interpreted by asking questions about the profession, gender, etc. of the person named. This method is called the exchange method because it is possible to ask what the other person does for the respondent and what the respondent does for this other person. The chance that the respondents' answers are open to several interpretations is much smaller when one uses this method, because names are first asked for on the basis of a particular interaction and only then is the question of the role relation (kin, etc.) for each name brought up. A great advantage of this method is that it can be steered by using the phrasing and theoretical approach of the research. If one wants to investigate the influence of social networks on health care, for example, it is possible to get information on the relevant parts of the respondent's network by asking about the people who provide information in respect of health care. Test-retest confidence studies have indicated that the exchange method supplies reliable answers. The exchange method is only somewhat less reliable than the role method and about as reliable as the affective method (Broese van Groenou, Van Sonderen and Ormel 1990, Marsden 1990).

2.3. Data and methods

2.3.1. Data

The data on which our study is based was collected as part of the "National Study of Morbidity and Interventions in General Practice" (Foets, Van der Velden and Van der Zee 1986). This research was intended to answer a number of scientific and policy questions within the field of primary health care. The research was carried out using a stratified random sample of Dutch general practitioners (N=161) and their registered patients (Foets and Van der Velden 1990). The sample was stratified non-proportionally in terms of region, degree of urbanization and distance from a hospital.

The data was collected by means of an extensive oral questionnaire used with a random sample of approximately 100 patients registered with the participating general practitioners. A number of questions in the patients' questionnaire concerned the relationship between health, health care and networks. No age limits for participation in the research were set. The analyses presented in this contribution, however, only relate to respondents of 18 years of age and older, because this group, in contradistinction to those below the age of 18, can be considered to be more free in choosing their network-members themselves.

The total scope of the random selection included 17,047 respondents; the response percentage for the total random sample was 76.6 %. As far as gender and age are concerned, the random sample deviates slightly from the population at large: the number of middle-aged respondents is over-represented, while there are somewhat fewer respondents above the age of 65.

The random sample of respondents was taken via a random sample of general practitioners. As a consequence of the non-proportional stratified character of the random sample of general practitioners, the distribution of the response to the patient questionnaire across the categories of the stratification variables deviated from the distribution of the Dutch population in terms of these categories. If one wants to make statements about the "Dutch population" then it is necessary to introduce weighting, at least if an effect of the stratification variables on the phenomenon to be described can be expected. Earlier analyses relating to a number of diverse dependent variables showed clear differences in terms of region and degree of urbanization, but not in terms of distance to a hospital. We have weighted our data so that it is corrected both for deviations in respect of the stratification procedure and for deviations in respect of differential non-response (this last in so far as possible). This means that we corrected for region and degree of urbanization, and also for gender and age[1].

2.3.2. Characteristics of networks

As stated, characteristics of personal networks can be divided into three categories: characteristics relating to the presence or absence of particular relations (social integration approach), characteristics in respect of what the social network could provide (social support approach) and characteristics of the structure of the networks (social network approach).

Social integration approach

Six characteristics of social integration are discussed. In the first place, the composition and size of the respondent's household. These variables indicate the relations which the actor has in his or her immediate social vicinity. The composition of the household was chosen instead of marital status because the last is often not sufficiently revealing. Divorced people sometimes live together with another person, but (correctly) indicate on the questionnaire that they are divorced. The questionnaire asked respondents to indicate their relation to all of the persons in their household, as well as the gender, age and marital status of these persons[2].

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[1] More information on the weighting procedures can be found in: Foets, M, and HJM Sixma 1991. *Nationale studie van ziekten en verrichtingen in de huisartspraktijk. Basisrapport: gezondheid en gezondheidsgedrag in de praktijkpopulatie* [National study of morbidity and interventions in general practice. Basic-report: health and health behaviour in the practice population]. Utrecht: NIVEL.

[2] The actual wording of the question was: "It is important for our research to know the composition of your household. Can you say what the relationship is between everyone who is part of your household, including yourself, and the head of the house? Please give your answer with the help of this card." The card that the respondents was given to answer the question includes the following possible answers: a. living alone; b. head of the house; c. head's spouse; d. head's permanent partner; e. head's child/stepchild; f. child of head's permanent partner; g. head's father/mother (in-law); h. head's son/daughter-in-law; j. head's grandchild; k. other member of head's family; i. no

A second characteristic of social integration is the frequency of church-attendance. The choice was made to show both frequency of attendance and church-membership, because people are often members of a particular church but never attend services and they are thus no longer integrated within the community by virtue of this membership[3].

Membership of voluntary organizations is a third characteristic of social integration. People who are members of (at least) one organization are regarded as being more integrated into the community than non-members. Respondents are asked whether they are members of a political party, a professional organization, a leisure or sports club[4]. We do not know the extent to which membership implies active participation in these clubs.

A further characteristic of social integration is work status. We consider people working outside the household more integrated than people staying home. Working status is not restricted to paid jobs. We also define people doing voluntary work, people in school or at college, men liable to military service, and people working outside the house without getting paid socially integrated through their work status.

The fifth characteristic of social integration is the number of "true" friends that people have. This characteristic can be assigned to the affective method of collecting data on social networks. People with many "true" friends are more integrated in society[5].

The number of support-givers is the final characteristic of social integration we employ here. We describe in the next paragraph how this measure was calculated.

Social support approach

The amount of support and the various types of support that the respondents receive from their network-members provide information on the function of social networks. Before these variables are described we shall look more closely at the operationalization of the personal network in our study.

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family relation with head. In this way, the respondent was able to indicate the relationship between a maximum of 10 people in his or her household with the head of the house. With the help of answers to the question concerning the dates of birth of the persons in the household, answers were recoded in three categories; i.e. 1 = partner, 2 = (grand)child up to 18, 3 = other adults. Finally the variables were combined per respondent to indicate what the composition of his or her household was (see table 2.4).

[3] Questions on the frequency of church-attendance were: "Do you regard yourself as a member of a religious congregation, a religious community or another similar institution? If the answer is yes, how often do you go to church in general and do you go to meetings? Is that at least once a week, 2 to 3 times per month, once a month, a couple of times a year, less often or never?" The last question was recoded to more than once a month and less often, as is usual with the CBS (1987).

[4] The question posed was: "Are you a member of one or more associations, clubs, professional organizations, etc.? If so, which?" On the basis of these questions a variable was composed which indicates whether the respondent is a member of one or more organizations.

[5] The question posed in the questionnaire was: "Can you indicate how many people you regard as true friends? People who belong to your own household should *not* be included." To calculate X^2, the absolute numbers are coded: 1 = 0, 2 = 1 to 3, 3 = 3 to 6, 4 = 6 to 12, 5 = 12 to 18, 6 = 18 and more.

Fischer's two-stage procedure (1982a), or the exchange method, is used as a means of collecting data on a number of characteristics of personal networks. The names of the network-members, about whom a number of characteristics were asked, are acquired by means of asking the names of persons from whom the respondent has received certain types of support[6]. In order to limit the number of names of network-members, only three network-members could be mentioned for each area of concern. In this, the names of network-members outside the household are asked for. It is reasonable to assume that members of a person's household will almost always be mentioned as providing support.

Next, we determined whether a particular type of support had been provided to the respondents by network-members. We further determined from how many members of the networks support was received and in how many areas the respondents had received support.

Social network approach

The third and last group of variables indicates what the structures of social networks look like. One of the relevant characteristics of network-members, who are mentioned in connection with questions about social support, is the relation they have to the respondent[7]. The relations that were admitted were kin, neighbours, colleagues, friends and acquaintances. In the literature on the structure of networks, the proportion of the network comprising kin is taken as an indicator of the homogeneity of the network and the chance that the network will provide ample (and various types of) support (in a broad sense, also e.g. information) (Dykstra 1990). The greater the proportion of kin in a

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[6] The name-generating question in the National Study was: "The next questions deal with a number of things you do together with other people, or for which you make an appeal to others. The questions concern those people *not* living in the same household as you are. The questions do concern other kin, friends, acquaintances, neighbours, etc. A. Do you talk with people when you have problems with your health? B. When you have a personal problem, do you talk about this with other people? C. Did you receive any help or assistance from people, with regard to a disease in the last few months? (e.g. shopping, getting medicines). D. Did anyone help you with jobs around the house in the last three months (e.g. painting, repairing things, cleaning up, cooking)? E. When you are away for a longer period of time, do you ask someone to watch the house, water the plants, etc.? F. Did you visit anyone last month, or did anyone visit you, or have you been going out with people?" For each item, the question is always asked: "Can you mention the names of at maximum three people?"
After the respondent had answered the above name-generating items, the interviewer placed the name of the person first mentioned with each item on the form. Where the first names did not differ from one another (after going through all six), the name of the second person was noted, so that there were six different names on the form. Then, for all respondents, variables were constructed to indicate what type of support they receive from their (maximum 6) network-members. In addition, a variable per respondent was given which indicates in how many sub-areas (0 to maximum 6) this respondent received support.

[7] For each network-member named, the respondent indicated on the form (among other things) the relationship which he or she had with this person. Possible categories were: kin, neighbour (someone in the neighbourhood), colleague, friend/acquaintance, or other. Only one of these answers was possible per network-member.

person's network, the more homogeneous the network and the less types of support received by the person from his or her network-members.

The same sort of reasoning is used in respect of the heterogeneity of networks in terms of gender and labour market participation of members (Flap and Tazelaar 1989). Individuals with a more homogeneous (less heterogeneous) network, will receive less (and fewer types of) support. Heterogeneity is calculated with the assistance of Simpson's heterogeneity index, which is called the index of qualitative variation[8]. This index of qualitative variation indicates the probability that two randomly selected individuals (here: members of a network) will be assigned to different categories. The index for gender, for example, is 0 when all of the respondent's network-members are of the same sex. If a respondent has mentioned 3 men and 3 women the index is 1. If a respondent mentions 2 men and 4 women (or 2 women and 4 men) then the index is 0.89; in the case of 1 man and 5 women the index is 0.64. In this calculation, the gender of the respondent is not included. Other forms of heterogeneity which have been investigated are heterogeneity in terms of age, marital status and education (Campbell, Marsden and Hurlbert 1986, Dykstra 1990). In the case of respondents in the current study, the only factors that were known about the network-members were their gender and whether they were in paid employment. The duration of the relation, the frequency of the contact and the time it would take to reach the respondent's home when necessary have remained beyond the scope of this chapter.

The characteristics of Dutch networks will be described in the order just presented. To facilitate comparison with other studies, these characteristics have been related to the

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[8] For each network-member named, the respondent indicated on the form whether this person was a man or a woman and whether he or she was in paid employment. The phrasing of this question excluded voluntary work. The heterogeneity of the group was established by using Simpson's diversity index (Agresti and Agresti 1977). This index reflects the probability of two randomly selected individuals being assigned to different categories. In the formula:

$D = 1 - \sum_{i=1}^{k} p_i^2$ where
D = diversity
k = number of categories
i = i-th category
p_i = number of observations (frequency) in category i divided by the total number of observations (N)

The maximum value of D is 1-1/k, where all the network-members are equally distributed over the categories of one variable. The minimal value of D is 0, which is reached when all network-members were to be allocated in the same category. A standardized version of D can reach the upper limit of 1 despite the number of categories (k):

$$I = (1 - \sum_{i=1}^{k} p_i^2) / (1-1/k) = [k/(k-1)]D$$

This standardization of D is also called the index of qualitative variation.

respondents' gender, age, education[9] and the degree of urbanization of their place of residence[10]. Foreign network research reveals that social networks of respondents with different background characteristics differ considerably. For example, women do not have larger or smaller networks than men, but have more homogeneous networks (Flap and Tazelaar 1989). Women's networks also seem to include more kin than men's networks (Marsden 1987). Age is an indicator of the phase of life in which the individuals find themselves. Older people, who continually see their contemporaries dying off around them, have smaller and more homogeneous networks than younger people (Marsden 1987). People with a higher level of education have larger and more heterogeneous networks than people with a lower level of education (Campbell, Marsden and Hurlbert 1986, Marsden 1987, Flap and Tazelaar 1989). People in the larger cities also have larger and more heterogeneous networks than people that live in villages (Fischer 1982a, Marsden 1987). In the section on results we shall see whether our conclusions regarding the networks of a representative random sample of the Dutch population accord with these findings.

2.3.3. Missing data

Burt's research (1987) shows that missing data in research on personal networks primarily arises when there are weak relations between ego and alter or among the alters. Burt sees weaker relations as those that are not assessed as close or intimate. Women, people aged 60 and over and people with a low level of education appear to be more able (and willing) to give information about the closeness of their networks than men, people under the age of 60 and those with a higher level of education. Missing data are extremely important for network analyses. The questions asked in order to generate names are more complex than is usual for questionnaires and answers to this sort of question may thus often be missing. When the data of network-members is aggregated at the level of the respondent (as for example in the heterogeneity of a personal network) the missing data play an important role. When a respondent does not provide data about his or her network-members this can mean two things: 1) the respondent did not wish to provide this data; 2) the respondent was not able to provide the data, or he or she has

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[9] In the case of 85 respondents, data was missing about the level of education. Education does not have to be completed.

[10] The distribution in terms of degree of urbanization is taken from the CBS (Foets and Van der Velden 1990). The degree of urbanization indicates the relative size of the place of residence of the general practitioner with whom the respondent is registered. We must assume that the respondent lives in the same area. A "low level of urbanization" refers to municipalities with a population of less than 30,000, an "intermediate level of urbanization" refers to municipalities with populations of 30,000 to 50,000 and a "high level of urbanization" indicates municipalities with a population of more than 50,000.

no knowledge of such data. In this last case, as Burt (1987) has determined, we can speak of weak relations.

How large is the problem presented by the missing network data in the National Study? Of the 10,110 respondents of 18 years of age and older (unweighted data) 4 did not answer one single name-generating question (see table 2.1) and 437 did not answer all the name-generating questions (in total 4.4 %). In addition 464 respondents were not able to mention names. This last group of respondents appears to know no one (outside their household) from whom they receive certain types of support (see note 6) or people that they visit or who visit them. Burt (1987) calls these people "isolates". The remaining 9,205 respondents mentioned one or more names.

Table 2.1. Frequency of missing data (N=10,110, unweighted data)

	Data for characteristics of network-members missing No	Yes	Not applicable	Total
Missing data for name-generators:				
Data for all 6 name-generators are missing	---	---	4	4
Data for at maximum 5 name-generators are missing	381	56	---	437
Data for all 6 name-generators are present (incl. 464 "isolates")	8,318	887	464	9,669
Total	8,699	943	468	10,110

In total 39,031 names (or initials) of network-members were mentioned. A number of characteristics of the respondents were filled in on a form (the last one of the questionnaire) (see note 7 and 8). For 1,484 network-members, one or more characteristics are missing. Apart from the 4 respondents who generated no names at all and the 464 "isolates", 943 respondents (9.3 % of 10,110) filled in the form only partially or not at all.

Following Burt, we investigated which respondents more often provided not all data about their network-members. There was no item in the questionnaire regarding the strength of the relation between the respondent and his or her network-members, or among the network-members themselves. Therefore, we cannot comment on the relationship between the missing data and the strength of relations. One derived measure for the strength of social relations is the frequency of contact (Marsden and Campbell 1984), although the relations with colleagues and neighbours will be overvalued while using this measure. The data will show whether the frequency of contact differs between network-members for whom the respondents have provided full data and those for whom they have not. Consequently, we shall first describe the frequency of contact with *network-members* for whom the respondent has not provided all the other data (gender and labour market participation, type and duration of the relations and distance from these people). Then we compare the characteristics of the *respondents* who have either answered or not fully answered all our questions about their network.

Table 2.2. Frequency of contact in terms of the presence of absence of data on network-members (N=39,031 network-members)

	Missing data No	 Yes	Total
Frequency of contact:			
once per week or more often	25,320	834	26,154
once per month or more often but less than once per week	8,127	326	8,453
less than once per month	4,100	324	4,424
Total	37,547	1,484	39,031

For 4 % (1,484) of the 39,031 network-members named there is no data other than the frequency of contact (see table 2.2). Chances on missing data are greater for network-members that have contact with the respondents less often than once per month than for network-members with more frequent contact, namely 7 % (324 network-members of all 4,424 in this category) as opposed to 4 % and 3 % (326 of 8,453 and 834 of 26,154 respectively). The relationship between the presence of data on network-members and the frequency of contact between them and the respondent is clear (Pearson's X-square, further noted as X^2, is 177.0, df=2, p<.001). In other words: data on network-members whom the respondent does not see frequently are more often missing than the data on network-members whom the respondent sees more frequently.

1,328 respondents did (or could) not provide *all* of the information about their personal network. This group comprises (see table 2.1) 4 respondents who did not answer any of the name-generating questions, and 437 respondents who did not answer all of them, plus 887 respondents who did answer all name-generating questions, but did not provide all of the data about their network-members. This group is contrasted in table 2.3 with the group of 8,318 respondents who answered all of the name-generating questions and provided all of the data on their network-members, plus the group of 464 "isolates" (in total N=8,782). These "isolates" have answered every name-generating question by stating that they did not know anyone from whom they received the relevant type of support.

Table 2.3 shows the characteristics of respondents who did provide all information on their network-members and of those who did not. As far as the missing data on networks is concerned, the "risk groups" includes the elderly (X^2=59.5, df=3, p<.001), people in more urbanized environments (X^2=16.3, df=2, p<.001), and women (X^2=8.4, df=1, p<.01). The relationship between missing network data and the level of education does not reach statistical significance ($X^2=8.5$, df=4, p=0.10).

Table 2.3. Background characteristics (in percentages) of respondents who provided all information on their network-members and of those who did not (N=10,110, unweighted data)

	Complete network data Yes (N=8,782)	No (N=1,328)	N
All	86.9	13.1	10,110
Gender			
Male	87.9	12.1	4,935
Female	85.9	14.1	5,175
Age			
18-24 years	90.2	9.8	1,442
25-44 years	88.3	11.7	4,529
45-64 years	85.2	14.8	2,731
65 and above	81.9	18.1	1,408
Education			
Primary	84.9	15.1	1,968
Lower secondary	87.3	12.7	2,881
Middle secondary	87.5	12.5	1,531
Upper secondary	87.5	12.5	2,224
Tertiary	87.0	13.0	1,412
Degree of urbanization			
Low	88.5	11.5	3,899
Intermediate	86.2	13.8	4,046
High	85.2	14.8	2,165

Our results in part match those of Burt (1987). Network-members on whom the respondent has not provided all of the data appear to have less frequent contact with the respondent. Respondents who do not provide all of the data on their network have different characteristics than we expected on the basis of Burt's results. This can be explained by the fact that Burt wanted to know explicitly for what sort of social relations data was often absent. He only looked at respondents who gave no information on the density of their network; we looked at respondents who did not provide information on gender, type and duration of the relation, distance to the person, frequency of contact and whether they were participating in the labour market. Apparently, respondents who do not provide information on the closeness of their network have different background characteristics than respondents who do not provide information on other characteristics of their network. The problem of missing data is, however, of comparable size as was the case with Burt's data. We have not been able to locate findings from other authors relating to missing network data.

In order to have the largest possible number of respondents on whose networks can be described, in the following analyses the variables are compared in pairs. We derive no further consequences for analyses to follow from these results, since missing data does not seem to be a large problem in our study.

2.4. Results

For clarity's sake it should be pointed out that the following results relate to weighted data.

Social integration approach

Table 2.4 describes the composition and size of the respondents' households. The last column in this table gives the percentages in terms of gender, age, education and degree of urbanization for the respondents studied.

Over 15 % of the respondents live alone and more than a quarter of the respondents live with a partner. The average size of the households is 2.92 (95 % two-tailed confidence interval (=c.i.) of 2.89 to 2.95[11]): each household is made up of an average of three persons (according to the Dutch central bureau for statistics (CBS 1990), this was 3.16 on 1 January 1987). From the point of view of the social integration approach, people living alone and one-parent families are interesting. Almost one out of five people in the Netherlands lives alone (19.2 %, made up of 15.6 % officially living alone plus 3.6 % adults who do live with someone else but without a permanent partner). This is in line with the national percentage of 18.5 (CBS 1988). More than 2 % of the respondents live in one-parent families (1.5 % single parents plus 0.8 % single parents with adults). This also corresponds to the national figure of 2.8 % (CBS 1988).

The subdivision in terms of gender, age, education and degree of urbanization does not provide any unexpected results. If we look at the degree of urbanization we find that the highest percentage of those living alone (23.6 %) is found in the most highly urbanized areas. The percentage of parents with children is the lowest in these places (21.5 % compared to 27.1 and 30.2 %). When we look at the different age categories, we immediately see that most of the respondents between the ages of 25 and 44 (55.4 %) have a household made up of a (married) couple with child(ren). Men and women differ in respect of the composition and size of the household: women live on average in a smaller household (c.i. for women 2.76-2.84, for men 3.01-3.09) what probably arises because, in comparison with men, women live less frequently in a household made up of a (married) couple with child(ren) (24.4 as against 27.7 %) and more often in one-parent families (2.4 as against 0.4 %) or alone (20.0 % as against 11.1 %).

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[11] Confidence intervals indicate which range of averages or proportions can be expected for a population on the basis of a random sample. When further confidence intervals are mentioned (c.i.) this always relates to a two-tailed 95% confidence interval. In the case of a large number of respondents (as is the case here), differences among groups of respondents rapidly assume significance. More information about the significance and relevance of the differences found can be derived from confidence intervals (Hays 1981).

Table 2.4. Composition (in percentages) and average size of household, in terms of gender, age, education and degree of urbanization (N=9,850)

	Composition of household								Size of household	N (%)
	a	b	c	d	e	f	g	h		
All	15.6	27.7	15.6	1.5	26.0	0.8	9.2	3.6	2.92	100
Gender										
Male	11.1	29.2	17.8	0.4	27.7	0.5	10.1	3.6	3.05	48.8
Female	20.0	26.2	13.6	2.4	24.4	1.1	8.2	4.0	2.80	51.2
Age										
18-24 years	11.0	18.3	34.9	0.4	4.2	2.0	23.0	6.0	3.35	15.4
25-44 years	10.4	18.0	4.8	2.9	55.4	0.7	6.3	1.5	3.32	41.5
45-64 years	12.5	34.7	27.3	0.5	8.8	0.8	11.0	4.5	2.79	26.8
65 and above	38.5	49.7	5.7	0.2	0.3	0.0	0.3	5.2	1.73	16.3
Education										
Primary	25.3	37.3	15.6	0.7	9.8	0.7	4.8	5.8	2.37	18.9
Lower secondary	8.1	25.7	15.5	1.4	33.3	0.9	11.6	3.4	3.22	26.6
Middle secondary	13.5	26.6	14.6	2.3	29.7	1.4	8.9	2.9	3.01	16.1
Upper secondary	12.0	25.0	20.1	1.3	25.5	0.9	12.3	3.0	3.11	22.7
Tertiary	23.7	24.9	10.0	1.6	39.7	0.2	6.1	2.8	2.70	15.7
Degree of urbanization										
Low	8.7	25.6	17.5	0.7	30.2	0.8	12.3	4.2	3.29	29.8
Intermediate	13.3	27.3	17.2	1.6	27.1	0.8	9.7	2.9	2.98	34.5
High	23.6	29.8	12.5	1.9	21.5	0.8	6.0	3.8	2.56	35.7

Composition of household:
a = living alone; b = (married) couple; c = (married) couple with other adult(s) and/or adult child(ren); d = single parent with child(ren); e = parents with child(ren); f = single parent with child(ren) with other adult(s) and/or adult child(ren); g = parents with child(ren) with other adult(s) and/or adult child(ren); h = adults without a permanent partner

Table 2.5 reveals three other aspects of integration in society: membership of voluntary organizations, churchgoing behaviour (this involves being a member of any church and church-attendance), and work status. 1,306 respondents have not provided any data about their membership of organizations and 191 respondents did not answer the question of on church-attendance.

On average, 60 % of the Dutch population are members of one or more organizations[12]. Men are more often a member than women (69.5 compared to 51.0 %). More than half of those above 64 years of age do not belong to organizations (any

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[12] These are in terms of the type of organization: political party 3.3 %; leisure club 14.7 %; sports club 25.5 %; professional organization 13.6 %; other 9.3 %. Comparable figures (Sociaal en Cultureel Planbureau 1988) are: 7 % of the Dutch population are members of a political party; 18 % are members of a leisure club (choir, hobby or youth club), 27 % are members of a sports club and 16 % are members of a professional organization. The percentages presented by the SCP are higher because they asked about respondent-membership in each type of organization. In the National Study questionnaire, respondents were only asked which organizations they were members of, which means that there is a greater chance for someone forgetting to mention an organization.

longer). The highest percentage of memberships was found in the 25 to 44 age group (64.4 %). Education has a clear relationship to membership of organizations. The higher the level of education, the more often people belong to one or more organizations. The opposite is true for the degree of urbanization: the lower the degree of urbanization, the more often people belong to one or more organizations.

Table 2.5. Membership of voluntary organizations, membership of church, church-attendance, and work status (in percentages and 95 % confidence intervals (=c.i.)), in terms of gender, age, education and degree of urbanization (N=9,850)

	Membership of organizations		Membership of church		Church attendance		Work status	
	%	95% c.i.	%	95% c.i.	%	95% c.i.	%	95% c.i.
All	60.3	59.3;61.3	52.6	51.6;53.6	23.5	22.7;24.3	56.9	55.9;57.9
Gender								
Male	69.5	68.1;70.9	48.3	46.9;49.7	19.6	18.5;20.7	72.7	71.4;74.0
Female	51.0	49.5;52.5	56.7	55.3;58.1	27.1	25.9;28.3	41.9	40.5;43.3
Age								
18-24 years	60.9	58.3;63.5	42.4	39.9;44.9	15.7	13.9;17.5	88.6	87.0;90.2
25-44 years	64.4	62.8;66.0	45.3	43.8;46.8	15.0	13.9;16.1	72.2	70.8;73.6
45-64 years	59.5	57.5;61.5	60.7	58.8;62.6	30.6	28.8;32.4	45.9	44.0;57.8
65 and above	49.8	47.1;52.5	67.8	65.5;70.1	40.2	37.8;42.6	5.7	4.6;6.8
Education								
Primary	47.9	45.4;50.4	65.9	63.7;68.1	36.9	34.7;39.1	20.1	18.3;21.9
Lower secondary	55.8	53.7;57.9	53.0	51.1;54.9	22.2	20.6;23.8	54.2	52.3;56.1
Middle secondary	58.6	56.0;61.2	51.7	49.2;54.2	21.2	19.2;23.2	53.7	51.2;56.2
Upper secondary	66.7	64.6;68.8	51.0	48.9;53.1	21.1	19.4;22.8	76.1	74.3;77.9
Tertiary	73.1	70.8;75.4	38.2	35.8;40.6	14.4	12.6;16.2	81.4	79.5;83.3
Degree of urbanization								
Low	64.8	63.0;66.6	66.6	64.9;68.3	35.5	33.8;37.2	56.6	54.8;58.4
Intermediate	60.3	58.5;62.1	54.0	52.3;55.7	21.1	19.7;22.5	57.8	56.1;59.5
High	56.3	54.5;58.1	39.7	38.1;41.3	15.7	14.5;16.9	56.2	54.6;57.8

More than half of the Dutch population is member of a church or religious community and almost a quarter of the population attend church more than once a month. According to the CBS (1987 and 1988), this last percentage has gone down from 36.3 % in 1977 to 26.6 % in 1986. This is consistent with the 23.5 % that we recorded for the Dutch population as a whole in 1987.

We find that the relationships between background characteristics and the frequency of church-attendance point in the same direction as do the relationships between background characteristics and church-membership. Older people go to church more often than younger. Women and those with a lower level of education go more often than men or those with a higher level of education. People who live in the countryside go more often than those who do not live in the countryside.

More than half of the respondents are integrated through work (56.9 %). Women, people with a lower level of education and people above the age of 64 are less often integrated through work than men, the higher eduated and younger people. With regard to degree urbanization people do not differ in work status. This is consistent with the findings of the CBS (1987).

In table 2.6, the averages and confidence intervals for the number of "true" friends are listed in terms of the respondents' gender, age, education and degree of urbanization. On average, the respondents have more than 6 "true" friends (c.i.=6.12-6.40). There are no clear differences between the groups of respondents, since all confidence intervals overlap. Women have more friends than men; the youngest respondents (18-24) have fewer friends than older respondents; categorized according to education, those with the lowest level of education have the most friends; and, in respect of the degree of urbanization, people living in the country have the largest number of friends.

Table 2.6. Averages and 95 % confidence intervals (=c.i.) for a) the number of "true" friends and b) the number of names mentioned, in terms of gender, age, education and degree of urbanization (N=9,850)

	Number of "true" friends		Number of names mentioned	
	average	95% c.i.	average	95% c.i.
Gender				
Male	6.22	6.01;6.43	3.77	3.72;3.82
Female	6.30	6.12;6.48	3.95	3.90;4.00
Age				
18-24 years	5.61	5.37;5.85	3.85	3.77;3.93
25-44 years	6.07	5.88;6.26	4.21	4.16;4.26
45-64 years	6.79	6.47;7.11	3.67	3.61;3.73
65 and above	6.60	6.18;7.02	3.32	3.23;3.41
Education				
Primary	6.53	6.11;6.95	3.23	3.15;3.31
Lower secondary	6.37	6.09;6.65	3.74	3.68;3.80
Middle secondary	6.24	5.89;6.59	3.90	3.82;3.98
Upper secondary	5.92	5.68;6.16	4.09	4.02;4.16
Tertiary	6.26	5.95;6.57	4.49	4.41;4.57
Degree of urbanization				
Low	6.77	6.38;7.16	3.77	3.71;3.83
Intermediate	6.37	6.06;6.68	3.91	3.85;3.97
High	5.74	5.40;6.08	3.90	3.84;3.96

Table 2.6 also contains data on the number of persons from whom respondents receive social support. On average, respondents mention just under 4 names in connection with the 6 areas of concern (c.i.=3.83-3.89, see note 6). Women, people between 25 and 44 years of age and residents of more heavily urbanized areas generally mention more names than men, people aged between 18 and 25 or older than 44 and residents of less heavily urbanized areas. The confidence intervals for the average

number of names that are mentioned in terms of gender and age do not overlap, but they do for the degree of urbanization. The higher the educational level, the more names mentioned in various areas of concern. The confidence intervals do not overlap here.

Social support approach

If we look at the areas of concern for which names are given (table 2.7), it is clear in any event that most of the Dutch people can mention names of people who have visited them or whom they have visited during the past month. Van der Poel (1993) came to the same conclusion. Those with a lower level of education and those above 64 do this least often. The smallest number of names were mentioned in response to the question as to whether the respondent had received help in the case of illness. Many people will probably not have been ill in the preceding month (see note 6) and for that reason were not able to mention any names. The fact that those above 64 were able to mention a name more often than younger respondents is probably a consequence of the fact that they are ill more often.

Table 2.7. Percentage of respondents and 95 % confidence intervals (=c.i.) who can mention names for each of 6 areas of concern in terms of gender, age, education and degree of urbanization (N=9,850)

	1		2		3		4		5		6	
	%	c.i.	%	c.i.	%	c.i.	%	c.i.	%	c.i.	%	c.i.
All	49.0	48.0;50.0	45.5	44.5;46.5	7.5	7.0;8.0	18.3	17.5;19.1	50.7	49.7;51.7	89.5	88.9;90.1
Gender												
Male	39.1	37.7;40.5	37.4	36.0;38.8	3.8	3.3;4.3	16.9	15.8;18.0	46.5	45.1;47.9	89.0	88.1;89.9
Female	58.4	57.0;59.8	53.2	51.8;54.6	10.9	10.0;11.8	19.7	18.6;20.8	54.7	53.3;56.1	90.0	89.2;90.8
Age												
18-24 years	58.8	56.0;61.0	62.4	60.0;64.8	6.3	5.1;7.5	15.3	13.5;17.1	21.8	19.7;23.9	92.8	91.5;94.1
25-44 years	55.6	54.1;57.1	53.3	51.8;54.8	7.1	6.3;7.9	21.0	19.7;22.3	64.2	62.7;65.7	92.3	91.5;93.1
45-64 years	42.7	40.8;44.6	35.2	33.4;37.0	5.1	4.3;5.9	13.5	12.2;14.8	50.3	48.4;52.2	87.5	86.2;88.8
65 and above	33.4	31.1;35.7	26.7	24.5;28.9	13.4	11.7;15.1	22.2	20.2;24.2	44.5	42.1;46.9	82.9	81.0;84.8
Education												
Primary	39.5	37.2;41.7	28.3	26.2;30.4	10.9	9.5;12.3	18.5	16.7;20.3	36.1	33.9;38.3	81.6	79.8;83.4
Lower secondary	44.6	42.7;46.5	39.4	37.5;41.3	5.3	4.4;6.2	15.3	13.9;16.7	44.7	42.8;46.6	88.5	87.3;89.5
Middle secondary	51.4	48.9;53.9	47.8	45.3;50.3	6.5	5.3;7.7	16.5	14.7;18.3	59.7	57.3;62.1	90.2	88.7;91.7
Upper secondary	52.5	50.4;54.6	51.4	49.3;53.5	6.3	5.3;7.3	18.2	16.6;19.8	52.1	50.0;54.2	93.7	92.7;94.7
Tertiary	60.3	57.9;62.7	66.0	63.6;68.4	9.6	8.1;11.1	25.5	23.2;27.7	67.3	64.9;69.7	94.8	93.7;95.9
Degree of urbanization												
Low	46.4	44.6;48.2	40.6	38.8;42.4	6.0	5.1;6.9	17.2	15.8;18.6	42.1	40.3;43.9	89.7	88.6;90.8
Intermediate	49.1	47.4;50.8	44.7	48.7;52.1	7.3	6.4;8.2	18.5	17.2;19.8	52.7	51.1;54.4	90.5	89.5;91.5
High	51.1	49.4;52.7	50.4	48.4;52.4	8.8	7.9;9.7	19.1	17.8;20.4	56.0	54.4;57.6	88.5	87.4;89.6

Names per area: percentage of respondents who:
1 = talks about health problems; 2 = talks about personal problems in general; 3 = receives assistance when ill; 4 = receives help in doing little jobs around the house; 5 = receives help when absent; 6 = either pays visits or is visited (at least with/from 1 of the 6 network-members)

Women are always able to mention more names than men in all areas. The difference between men and women is particularly great in respect to talking about personal problems in general and health problems in particular. Those with a higher level of education mention more names in all areas than those with a lower level of education, in particular with regard to talking about (health) problems and people who look after things for them in their absence. People in heavily urbanized areas mention more names when it is a question of emotional support (for example, in discussing health problems). When it is a matter of practical assistance, such as jobs about the house, they mention as many names as those in the less heavily urbanized areas.

Social network approach

Data relevant for the social network approach can be found in table 2.8. The proportion of kin in a network is only calculated for respondents who were able to mention more than one name. The heterogeneity within a network is only calculated for respondents who were able to mention two or more names.

For the Dutch, the proportion of kin who provide support in the network is .41 (c.i.=0.40-0.42). On average, women have more kin in this network than men. The difference is not very large, since the confidence intervals are close to one another.

The older a person is, the higher the proportion of kin who provide support in the network. There is no question of any overlap between the confidence intervals, although for the 25 to 44 and 45 to 64 age groups they are very close together. Furthermore, the higher the level of education, the lower the proportion of kin. And the higher the degree of urbanization, the lower the proportion of kin. The confidence intervals in terms of degree of urbanization overlap to a considerable degree; the confidence intervals for the educational groups do not overlap at all.

The results for heterogeneity in terms of gender show the same tendency, with the understanding that the supportive components of women's networks, as well as those of older respondents, respondents with a lower level of education and respondents living in rural municipalities, are less heterogeneous than is the case with men, younger respondents, those with a high level of education and respondents living in the large cities. The confidence intervals of the different categories per background characteristic overlap considerably, with the exception of those related to gender.

As regards heterogeneity in terms of participation in the labour market, there is no clear pattern to be discerned. Although there are some differences between the age groups and the educational groups, the confidence intervals virtually correspond. For the entire group of respondents, heterogeneity, in terms of work, is not large (c.i.=0.57-0.59).

Table 2.8. Proportion of kin, heterogeneity of gender and labour market participation and the 95 % confidence intervals (=c.i.), in terms of gender, age, education, and degree of urbanization (N=9,850)

	Proportion of kin		Heterogeneity of gender		Heterogeneity of labour market participation	
	%	95% c.i.	0-1	95% c.i.	0-1	95% c.i.
All	0.41	0.40;0.42	0.63	0.62;0.64	0.58	0.57;0.59
Gender						
Male	0.39	0.38;0.40	0.70	0.69;0.71	0.58	0.57;0.59
Female	0.43	0.42;0.44	0.57	0.56;0.58	0.59	0.58;0.60
Age						
18-24 years	0.26	0.24;0.28	0.66	0.64;0.68	0.57	0.54;0.60
25-44 years	0.40	0.38;0.42	0.65	0.63;0.67	0.63	0.61;0.65
45-64 years	0.45	0.43;0.47	0.61	0.59;0.63	0.57	0.55;0.59
65 and above	0.51	0.48;0.54	0.60	0.57;0.63	0.50	0.47;0.53
Education						
Primary	0.54	0.52;0.56	0.57	0.55;0.59	0.50	0.47;0.53
Lower secondary	0.47	0.45;0.49	0.62	0.60;0.64	0.60	0.58;0.62
Middle secondary	0.41	0.38;0.44	0.63	0.60;0.66	0.61	0.58;0.64
Upper secondary	0.33	0.31;0.35	0.64	0.62;0.66	0.59	0.57;0.61
Tertiary	0.28	0.26;0.30	0.71	0.69;0.73	0.61	0.59;0.63
Degree of urbanization						
Low	0.43	0.41;0.45	0.60	0.58;0.62	0.58	0.56;0.60
Intermediate	0.42	0.40;0.44	0.63	0.61;0.65	0.60	0.58;0.62
High	0.38	0.36;0.40	0.66	0.64;0.68	0.58	0.56;0.60

2.5. Discussion

The results of our research relating to social integration indicate that the vast majority of the Dutch population live with one or more people (85 %), that 60 % are members of one or more voluntary organizations and that almost 25 % go to church on a regular basis. More than half of the Dutch work outside the house. It appears that most Dutch people are integrated in a range of organizations (nuclear family, voluntary organization, church, work). Most of the Dutch receive social support in the areas of concern from 4 (out of a maximum of 6) network-members. The characteristics of the networks that provide this support are that they are made up for 40 % of kin members and are homogeneous in terms of gender and participation in the labour market. The great majority of the Dutch have also recently received support from people other than their kin. In respect of kin, our questions have certain shortcomings. We ask specifically about those who provide support from outside the household. A number of kin, in particular those who live in one household with the respondent, are consequently automatically excluded.

Marsden (1987) described the structure of the networks of Americans on the basis of the response given by more than 1,500 people (a representative sample of the US population) in the General Social Survey (GSS) in 1985, when they were asked to name people with whom they discussed matters of importance[13] and to answer a number of supplementary questions relating to the characteristics of these people and their relations with one another. Marsden had only one name-generating question available. Compared with the Dutch, the Americans report relatively small networks (an average of 3 names mentioned, while the Dutch mention an average of 4 names in response to 6 name-generating questions in our research). Additional data (such as type of relation) was also requested for a maximum of 5 members of the respondents' networks. The greater part of the American network comprises kin (55 %). The average Dutch network comprises 41 % kin, but in our research, in contrast to the GSS, we explicitly asked about network-members outside the household. These figures are not easily compared, since Marsden used only one name-generating question which, moreover, also differed from the ones we used.

In contradistinction to what Flap and Tazelaar report in their review (1989), women's and men's networks in the Netherlands do differ in terms of size: the number of names that women are able to mention in all areas of concern is greater than the number of names that men mention. Marsden's findings in the United States (1987), which show that women's networks comprise more kin members than men's networks and that the elderly have smaller and more homogeneous networks than the young ones, are replicated for the Netherlands.

An interesting result emerging from our research are the relationships of educational level and degree of urbanization with the different characteristics of personal networks. The higher the level of education, the more often people are members of voluntary organizations, but the less often they are members of church. People with a higher level of education are able to mention more names of people who provided support in the different areas of concern than those with a lower level of education. The proportion of kin in the network is lowest for those with the highest level of education. Our results for the Dutch population are in accordance with those of others mentioned earlier (Campbell, Marsden and Hurlbert 1986, Marsden 1987, Flap and Tazelaar 1989). People who live in large cities are less often members of an organization or church, they live in smaller households, but are able to mention more names when asked about support in various areas of concern. The proportion of kin in this network and the number of "true" friends is lowest for people who live in the large cities. Similar results were found by Fischer (1982a) in the United States.

Something which is difficult to compare is the number of "true" friends. For those with a higher level of education and the young, the number of "true" friends in the Netherlands

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[13] The precise formulation of the question was: "From time to time, most people discuss important matters with other people. Looking back over the last six months - who are the people with whom you discussed matters important to you? Just tell me their first names or initials." (Marsden 1987, p. 123).

is the lowest. In the United States it appears that older people and people from the lower social classes have fewer "true" friends than younger people and people from the higher social classes (Fischer 1982b, Burt 1991). Probably, a methodological question is involved here, i.e., the cultural definition of the term "true" friend. Earlier research in the United States has shown that people from various social classes and different age groups give a different interpretation to the term "true" friend. According to Burt (1991), this arises because there is often a high frequency of contact and closeness with kin in the networks of people from the lower social classes and the old, while people from the higher social classes and younger people experience these characteristics in other types of relations as well. In other words, what one understands by "true" friend is also a function of the frequency of contact and is sometimes ambiguous. How these characteristics of social relations relate to the Dutch situation has, as far as we know, not yet been investigated. In a recent international comparative study, the number of "true" friends mentioned by people in the United States is higher for older people than for the young (Höllinger and Haller 1990). They were also unable to offer an explanation for this. Compared to other European countries as Austria, Hungary, Great Britain, Italy and West Germany, the Dutch report on average a very high number of friends. The number of friends the Dutch report seems to be comparable to those reported in Australia and the USA. Maybe, the Dutch as well as the Americans and the Australians, define the concept of "friend" in a wider and more casual way than other nations (Fischer 1982b, Höllinger and Haller 1990).

A second methodological observation relates to the reliability of the measured network characteristics in general. In earlier research, reliability was established in various ways (Marsden 1990), by comparing the measured network characteristics to an observed or otherwise familiar standard, to answers of network-members, or to the results of earlier measurements (the so-called test-retest studies). According to Marsden, a number of studies have shown that people are quite capable of reporting on interactions that often take place. Chance encounters, on the other hand, are often forgotten. Burt's research (1987) shows that missing data in research on personal networks are prominent in the case of weak relations between ego and alter or among the alters. Our research shows that network-members for whom the respondent does not provide all the data have less frequent contact with the respondent. The stability of the network measured is greater in proportion to the extent to which the relations are closer (Broese van Groenou, Van Sonderen and Ormel 1990). The reliability of the network measured in terms of the exchange method (as was the case in our research) appears to be greater than when the GSS instrument is used.

The object of this chapter was to present data on networks of a cross-section of the Dutch population. Owing to the relatively large size of the random sample it was possible to divide it according to age, gender, education and degree of urbanization without making the number of respondents on whom the findings were based too small. The questionnaire offered the option of presenting data on all three approaches which are used in research into personal networks. It is true that, as a result of pragmatic choices in our research plan, problems may arise in respect of comparability with other research. The number of names mentioned by respondents of people from whom they received support is limited, and the number of network-members about whom information was asked and the nature of the information requested is also limited. Research which is exclusively limited to networks often encounters these limitations to a lesser degree. Nevertheless, we offer our data as a point of departure for research into the personal networks of specific groups in the Dutch population. In order to illustrate this, we would like to compare the results of two recent studies with those obtained for the Dutch population. The first study, by Broese van Groenou (1991), concerns the former marital networks (i.e., pre-divorce networks) of recently divorced people (N=136). With the assistance of 7 name-generating questions and using the exchange-method as developed by Fischer (1982a), the structural and support characteristics of the personal networks were listed. A maximum of 10 names were noted. With the assistance of the role method, Broese van Groenou checked whether the members of the family of origin, children, parents-in-law and any new partners were mentioned. If this was not the case, they were added to the list afterwards. Data was asked about 35 network-members. It should be said that our measuring instrument differs from that of Broese van Groenou on a number of points (in particular regarding the number of name-generating questions and the number of network-members about whom characteristics were asked). We compared the results of Broese van Groenou with our results in respect of the number of names mentioned in the six areas of concern and the proportion of kin in this network.

The marital networks of the recently divorced (Broese van Groenou 1991, table 4.3, p. 87) deviate in a number of repects from those for the Dutch population. The size of the marital network of the recently divorced with different educational levels is the same. For the Dutch population in general, it appears that networks increase in size with the level of education. That networks of recently divorced women were greater than those of recently divorced men and, that networks of those in the 30 to 39 age group are the largest, accords with the general picture that our research provides. The proportion of kin in the marital network is lower among recently divorced women than among recently divorced men. In this respect, the composition of the marital networks of the recently divorced deviates from that of men and women in general: the proportion of kin in women's networks is, in our research, somewhat greater than in the case of men. The proportion of kin decreases with age in the case of the recently divorced; in the average network, the proportion of kin increases with age. The finding that the proportion of kin decreases with the level of education agrees with our results.

A study into the well-being of the elderly by Dykstra (1990) also offers an opportunity to compare networks. Using the affective method, people aged 65 to 75 were asked to mention the names of all people whom they saw often and with whom they had a close personal relation. A number of characteristics were asked about the 6 most important persons. These data on the core network were compared with the results of our research regarding the proportion of kin in the network. In our research, the proportion of kin in the network is greatest in the group of people over 64 (this is approximately the same research population as that of Dykstra), i.e., 51 %. The percentages found by Dykstra are in general higher: 68 % for people who were married earlier or who have lived together (N=89) and 82 % for people who are now married or live together (N=60). The core network of people who did never marry nor lived together (N=42) consists for 34 % of kin. There are a number of reasons for this difference in results. Dykstra used the affective method to ask for the names of network-members. In our research, the exchange method was used. Research has shown that these methods only describe a partially overlapping part of the network (Bernard et al. 1990, Van der Poel 1993). A second cause could be that members of the household (largely kin) are not included in the networks we investigated, while they are included in Dykstra's research.

If one were interested in social networks as such, a logical follow-up to our description of Dutch networks would be to conduct research into the extent to which there is cumulation or substitution of social relations. In other words, do people who are less integrated receive less support, or do they compensate for the absence of traditional relations (kin, voluntary organizations, church, and work) with "modern" relations that provide social support. Some indication of the existence of this last aspect is to be found in this chapter. People, for example, who live in smaller households in highly urbanized areas are less often a member of a voluntary organization or a church, but they are able to mention names of people from whom they receive support in various areas of concern. As far as those with a higher education are concerned, the same rationale can be used: they often live alone and are not members of a church, but they also mention many people who provide support. On the basis of this cursory survey of the results, we cannot comment on cumulation or substitution of social relations. Van Leeuwen, Flap and Tijhuis (1993) presented more pertinent results.

Since we are interested here in relationships between social networks and health, our next step is to describe these relationships. This will be done in the next chapter.

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3. Characteristics of social networks and health

3.1. Introduction

Over the last twenty years, research into the relationship between social networks and health has increased considerably throughout the western world. The focus has been on describing the characteristics of networks of groups of respondents with particular diseases (Reed et al. 1983, Hanson and Östergren 1987, Avis et al. 1991), in which receiving social support has often been the central issue (Brugha 1988). A point of reference in the form of a survey of network characteristics of a larger group of respondents or of a "healthy" population, which would allow a decision or an answer to the question of which leads to what, has generally been conspicuous by its absence. Longitudinal research into mortality (Berkman and Syme 1979, Blazer 1982, House, Robbins and Metzner 1982, Schoenbach et al. 1986, Orth-Gomér and Johnson 1987, Hanson et al. 1989, Olsen et al. 1991, Hirdes and Forbes 1992) forms a second important current in research on relationships between social networks and health. This sort of research often concerns older respondents, since their risk of mortality is greater and the costs of the research are thus easier to control. In the Netherlands, research into the relationships between social networks and health has been limited to groups of patients (Ros 1990, De Witte 1991, Janssen 1992). In some studies, a comparison is made between network characteristics of the healthy and the sick (Mootz and Konings-Van der Snoek 1987, Van den Bos 1989, De Boer 1990, Janssen 1992), but a description of relationships between health and the social network for a cross-section of the Dutch population has not been available thus far. We want to fill this gap with the study presented in this chapter. The central questions here are: *1) What characteristics of social networks are related to health in the population?; 2) Do these relationships still exist when attention is paid to such socio-demographic characteristics as age, gender and socio-economic status[1]?; and 3) Do the relationships of age, gender and socio-economic status with health remain when attention is paid to characteristics of the social network?* According to the research literature, age, gender and socio-economic status are characteristics that are strongly related both to health and to social networks (see chapter 2 for relationships with network characteristics, for relationships with health see Doornbos and Kromhout 1990, CBS 1992), therefore, it is necessary to take the influence of these factors into account.

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[1] In contradistinction to the second chapter, in which we describe the characteristics of the social networks of "the" Dutch, the respondents' degree of urbanization has not been considered in the current study. The population in the large cities in the Netherlands does appear to be in a poorer state of health than people outside the cities, but if age and gender are taken into account these differences for the most part disappear (Verheij, De Bakker and Van der Velden 1992).

Research on social networks in relation to, for instance, health, is carried out largely on the basis of three differing approaches (House, Umberson and Landis 1988). The first approach is the social integration/isolation approach. The existence and number of social relations are the central network characteristics of this approach. In the longitudinal studies of mortality mentioned earlier, these types of network characteristics are used. People who are more integrated appear to have smaller chances of morbidity and mortality. The second approach is based on the structure of the social network. Examples of structural characteristics of a network are density (number of relations among network-members) and homogeneity (the degree to which network-members resemble one another in particular respects). A high level of density and homogeneity in a network is considered to have a positive influence on health. There has not been, however, much empirical research on this point (Berkman 1985, Palinkas, Wingard and Barrett-Connor 1990). The third approach focuses on the functions of social relations. The function of relations can be determined by the amount and type of support these relations provide (House and Kahn 1985)[2]. More support is assumed to lead to less (serious) illness.

In this chapter, we intend to relate the characteristics of social networks, classified in the tripartite order of integration, structure and content, to the occurrence of complaints and diseases. The central question to this chapter is: *Are social network and health characteristics related for a Dutch representative sample?*

3.2. Data and methods

The data for this article are collected by means of health interviews in the context of the "National Study of Morbidity and Interventions in General Practice" (Foets and Van der Velden 1990). The respondents are selected on a random basis from the records of 161 general practitioners. Since practically the entire population of the Netherlands is registered with a general practitioner and because the random sample is virtually identical to the Dutch population in terms of age and gender (Foets and Van der Velden 1990), our sample can be regarded as representative. The total sample comprises 17,047 respondents of all ages, with a response rate of 77 %. We only present the results for respondents aged 18 years and older here (N=10,110), since it can be assumed that this group acts more autonomously in building its own networks than younger respondents.

Health is operationalized as the absence of complaints and diseases. We have measured it in various ways: by means of the state of health experienced and by using lists of minor complaints, psychiatric complaints and chronic diseases. The state of

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[2] House, Umberson and Landis (1988) mention three types of content: social support, social regulation and social conflict. Since social regulation and social conflict are not measured directly in our research, the analyses on the functions of social networks are limited in this chapter to social support.

health experienced is indicated by respondents on a 5-point scale, running from "very good" (1) to "very bad" (5). The percentage of respondents who regard themselves as not healthy (scores 3, 4 and 5) has been calculated. Minor complaints suffered in the last two weeks before the interview have been measured with the help of a list of 42 complaints (Foets and Van der Velden 1990). The percentage of respondents reporting one or more complaints is calculated[3]. In order to measure psychiatric complaints we use the General Health Questionnaire (GHQ-30, Goldberg 1972). The GHQ is intended as a screening instrument in the first phase of the detection of psychiatric illness. A respondent who gives an affirmative answer to 5 or more items is a possible psychiatric "case" (Goldberg 1972, Tarnopolsky et al. 1979). The GHQ must be regarded as a measure for current psychiatric health compared to the "normal" condition of the respondent in question. The percentage of respondents rated as possible psychiatric "cases" has been taken as the indicator of illness. The last indicator relates to chronic diseases and can be considered a more objective measure of health. The presence of chronic diseases is assessed with the assistance of a checklist developed by Van den Bos (1989). The respondent is asked to indicate whether he or she suffers from one or more of the diseases indicated on a list of 25[4]. The percentage of respondents reporting one or more chronic diseases is calculated. Table 3.1 shows how many respondents are unhealthy according to each indicator.

The variables in the next group are indicators of the social network. The available network characteristics have been divided into three groups. The first group comprises indicators of social integration. In our research we have the following characteristics at our disposal: the composition and size of the household, the number of "true" friends, church-membership and frequency of church-attendance, membership of voluntary organizations, work status, and the number of people who provide support. Here we

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[3] Of the 42 complaints in the list, 2 were excluded for this study because they are not direct indicators of (physical or mental) health: problems at work, and family problems. The list contains the following other complaints: fever, general tiredness, general weakness, sweating problems, headache, vertigo/dizziness, throat complaints, ear pain/earache, buzzing, hearing complaints, sneezing/nasal congestion, nose bleed/epistaxis, cough, pressure/tightness attributed to the heart, palpitations /aware of heartbeat, pain attributed to the heart, nausea, vomiting, diarrhoea, heartburn, stomach ache or pain, cramps, constipation, teeth/gum complaints, painful urination, incontinence, neck or shoulder complaints, hip complaints, back complaints, arm-, hand- or finger complaints, leg-, thigh, foot- or toe complaints, menstrual pain.

[4] These 25 chronic diseases are (in order of appearance on the check-list): chronic bronchitis/emphysema, asthma, hay fever, hypertension, heart complaints, cardiac failure, haemorrhoids, varices, ulcus cruris, arterio-sclerosis, backache (slipped disc, sciatica), rheumatism/arthritis/arthrosis, neoplasm/cancer, diseases of the nervous system (Parkinson's disease, multiple sclerosis, epilepsy), migraine/chronic headache, chronic gastro-intestinal disorders, diabetes, gall-bladder and liver diseases, kidney diseases, thyroid gland diseases, prostatism/prostatis, menstruation/menopause complaints, chronic skin diseases/eczema, serious consequences of an accident, hereditary handicaps. Respondents with asthma and chronic bronchitis are included together. Respondents with heart complaints and cardiac failure are also included together, because these diseases belong to the same group in terms of symptoms. The original list also included an "other" category. This category has been left out of this study because we regard the responses which it generated to be less reliable.

discuss the way in which church-membership and frequency of church-attendance is established. The remaining indicators were described in chapter 2. Church-membership and attendance are combined into active membership (coded as 0=no membership or no active membership, or 1=active membership). Active membership is operationalized as being a member of a church and attending church more than once a month. Almost 70 % of the respondents are not active church-members.

The structure of the network is determined on the basis of questions about the characteristics of those giving support. The names of these support-givers have been acquired by what is called the exchange method (Fischer 1982). The question is posed as to whether the respondents received support in six areas of concern and, if so, from whom[5]. Then a number of characteristics of the persons mentioned were noted, such as gender, type of relation (kin, friend, colleague, neighbour or other), the duration of the relation, how quickly the person could reach the respondent (travelling time), how often they have contact and whether this person is in paid employment. The following structural characteristics were calculated for each respondent: the proportion of long-standing relations, the proportion of people living nearby, the proportion of people with whom one has frequent contact, the proportion of kin, the proportion of colleagues, heterogeneity of gender and labour market participation[6]. The proportions were calcu-

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[5] The name-generating question in the National Study is: "The next questions deal with a number of things you do together with other people, or for which you make an appeal to others. The questions concern those people not living in the same household as you are. The questions do concern other kin, friends, acquaintances, neighbours etc. A. Do you talk with people when you have problems with your health? B. When you have a personal problem, do you talk about this with other people? C. Did you receive any help or assistance from people, with regard to a disease in the last few months? (e.g. shopping, getting medicines) D. Did anyone help you with jobs around the house in the last three months? (e.g. painting, repairing things, cleaning up, cooking). E. When you are away for a longer period of time, do you ask someone to watch the house, water the plants etc.? F. Did you visit anyone last month, or did anyone visit you, or have you been out with people?" For each item, the question was always asked: "Can you mention the names of a maximum of three people?"
After the respondent had answered the above name-generating items, the interviewer placed the name of the person first mentioned in connection with each item on the form. Where the first names were the same, after going through all six, the name of the second person was noted, so that there were six different names on the form. A variable was constructed for each respondent indicating the number of network-members (0 to maximum 6) from which this respondent received support.

[6] The choice for both proportions and measures for heterogeneity was based on the assumption that these could be interpreted differently. Heterogeneity could influence the number of different sorts of support that are received, and people that receive more types of support are expected to be healthier (Van Leeuwen, Flap and Tijhuis 1993). The proportion might influence whether or not support is received. People with a heterogeneous network in terms of gender should receive more sorts of support, because men in general provide different types of support than women (Wellman and Wortley 1989, Felling, Fiselier and Van der Poel 1991). And people in paid employment should give other sorts of support than people who are not in paid employment. People can more often depend on those whom they know longer, who live closer by, and with whom they have had more contact (Wellman and Wortley 1989, Dykstra 1990, Felling, Fiselier and Van der Poel 1991). The proportion of kin in a network can be seen as a measure for homogeneity as well as a derivative of a measure for the density of a network; after all, the greater the number of kin in a network, the greater the chance that network members will have contact with one another. On the other hand, the proportion of colleagues can be regarded as a measure for the openness of the network. The

lated by comparing the number of people with whom one has a relation longer (longer than 10 years), or who lived nearby (maximum 10 minutes travelling time), or with whom one has frequent contact (once a week or more), or kin, or colleagues, with the total number of supporters. The heterogeneity was calculated with the assistance of Simpson's index of heterogeneity, the index of qualitative variation (Agresti and Agresti 1977, Marsden 1987). The index for gender, for example, is 0 when all of the respondent's network-members were of the same gender. In chapter 2, the proportion of kin and the heterogeneity of gender and labour market participation have already been described. 15 % of the respondents have no long-standing relations, 13 % of the respondents have no contacts living nearby and 6 % of the respondents have no relations with whom they have frequent contact. The distributions of these variables are all not very different from the normal distribution. An exception to this is formed by the proportion of colleagues: more than 80 % of the respondents did not mention colleagues as support-givers.

The content of social relations, the third approach used in this study on social networks, is limited in our study to types of social support. In order to be able to determine the amount and type of support that someone receives, use was made of the exchange method mentioned above. The types of support most generally distinguished by researchers are emotional support, practical support, information and "social companionship" (House and Kahn 1985, Schonfeld 1991). The six areas of concern in which support can be received in our research can be distinguished in terms of general (see note 5: items B, D and F) and health-related support (items A and C) and, within these categories, in emotional (health-related: item A; general: item B) and practical support (health-related: item, C; general: items D and E) and "social companionship" (item F). 44 % of the respondents report that they had received general emotional support, 56 % had received general practical support, and 87 % had been visited, had made visits themselves or had gone out with a person ("social companionship"). 49 % said that they had received health-related emotional support, and 7 % said that in the past months they did receive practical support in connection with health problems. We did not directly measure information as a type of support. From the fact that people had social contacts within the health care system[7], we inferred that they should have access to information on matters of relevance to the illness process. Almost half of all respondents had social contacts with people employed in the health care system.

The general characteristics of respondents, such as gender, age and socio-economic

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density of a network could be positively related to health (Bowling 1991).

[7] The questions on "information" in the list are the following: "Do the people with whom you have regular contact include people working in mental health care? Do the people with whom you have regular contact include people working in general health care? Do the people with whom you have regular contact include people who are not working but have been trained as ...?" The respondents were then asked which jobs these people have or were trained for. Respondents with contacts in health care such as caring professionals, nurses, specialists, etc. (but not in administration) received the score of 1, the others scored 0 on "information".

status, were included in this study as control variables. Research literature shows that these characteristics are strongly related to both the occurrence of complaints and diseases and the characteristics of social networks. The socio-economic status of a respondent is derived from his/her education (varying from 1=low, through 5=high). The distribution of the respondents with respect to these characteristics is virtually identical to the Dutch population as a whole.

The first step in answering the question on relationships between social network characteristics and health was to carry out bi-variate analyses. For each network characteristic, the percentage of respondents who reported complaints or diseases was calculated. The tests of significance (Pearson's X^2) for these analyses primarily show us whether found differences are small or large. With the help of multiple regression, it was determined whether any relationship between network characteristics and health continued to exist if gender, age and education of respondents were taken into account. In respect of these last analyses, the nominal characteristics of the network were transformed into dummy variables (Weisberg 1985). This applies to the composition of the household, church-membership, membership of voluntary organizations and whether or not respondents received various types of support. The remaining network characteristics are taken up as continuous variables. Gender is also included as a dummy variable. Age and education are included as continuous variables. The relationships between the occurrence of complaints or diseases and network characteristics were determined by the use of logistic regression analyses (Hosmer and Lemeshow 1989). For each combination of health and network characteristic separate analyses were performed. This means that in table 3.2 the results of 88 logistic regression analyses are shown. For each analysis we first entered the variables in control, like gender, age and education. In a second step we entered the characteristic of concern of the social network. The statistical significance of the coefficients was subjected to a one-tailed test, since the literature assumes a specific direction in the relationships.

3.3. Results

In table 3.1 the characteristics of social networks are related to the occurrence of complaints and diseases. The most important conclusion that can be drawn from these results is that characteristics of integration have a relationship to health in the manner which we have assumed. People who are more integrated are less frequently ill. An exception with respect of the characteristics of integration is formed by the indicator of the number of support-givers and church-membership. For almost all types of complaints and diseases, it can be stated that having more support-givers is paired with increased illness. The same relationship is seen again when we look at relationships between illness and receiving various types of support. It is almost always true that receiving a specific type of support is paired with illness, with a single exception (the general types of support relate mostly to less chronic diseases). Church-membership is positively related to the occurrence of complaints or diseases and feeling in bad health. We shall return to this below.

In respect of the structural characteristics of the social networks, the results differ in relation to the measurement of health that we use. In general, it can be said that a greater proportion of long-standing and kin relations is related to a higher occurrence of diseases or complaints. A greater proportion of colleagues is primarily related to a lower occurrence of complaints or diseases. These bi-variate analyses further show that, especially for the proportion of long-standing relations and of people with whom one has frequent contact, relationships with health are not always linear.

Relationships between church-membership (but also the proportion of long-standing relations and members of kin), for example, and the occurrence of illness seems to be strongly determined by age and perhaps also by gender. From data shown in chapter 2, it appears that women and older people are more often members of a church community than men or younger people, and that women and older people more often display (especially minor) complaints than men and younger people. These sorts of cross-relationships with gender, age and education are valid for most indicators of illness and social networks that we use here. A part of the relationship between network characteristics and illness should accordingly disappear if we included gender, age and education in the analysis. In table 3.2, the results of this sort of analysis are shown.

If we take account of the socio-demographic characteristics of respondents which both relate to indicators of illness and to indicators of the social network, many of the relationships between network characteristics and illness do in fact disappear. However, a number of relationships were found after multiple analyses which did not reach statistical significance in bi-variate terms. The characteristics of integration, such as the composition and size of the household, active church-membership, membership of voluntary organizations, and work status, generally retain, when they have been controlled for age, gender and education, their relationship with indicators of illness, although this appears to be less clearly the case for the relationship with chronic diseases. Characteristics of the structure of networks and illness do not generally relate to one another if we take account of gender, age and education of the respondents. Most types of support have a positive relationship with the occurrence of complaints and diseases, whereas we expected that people who receive support would be less frequently ill[8].

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[8] We also calculated the number of chronic diseases or minor complaints as reported by the respondents. The mean number of diseases is 1.0 and the mean number of complaints is 3.9. Relationships between number of diseases or complaints and social networks characteristics hardly differ from those for the occurrence (coded no or yes) of chronic diseases or minor complaints respectively. Multiple analyses for the number of diseases or complaints concerned linear regression. We choose to present analyses for the occurrence of diseases or complaints, because the data were unable to follow the normal distribution of the errors as assumed for linear regression. Weisberg (1985) proposed several transformations of the dependent variable for cases like this. We used the transformation of $\sqrt{y} + \sqrt{(y+1)}$ for the linear regression analyses. Results for both kinds of analyses, linear or logistic regression, were always quite the same.

Table 3.1. Percentage of respondents that reports one of the chronic diseases, percentage of respondents that reports one of the minor complaints, percentage of respondents with psychiatric complaints, and percentage of respondents feeling in bad health, per network characteristic (N=10,110)

	Chronic diseases	Minor complaints	Psychiatric complaints	Feeling in bad health
all respondents:	55.1	80.1	12.8	17.1
Measures of social integration:				
composition of the household:				
alone	62.1	82.7	18.7	25.2
one-parent	58.1	87.2	28.5	17.4
two-parent	50.2	78.3	11.6	10.2
couple	56.8***	80.4***	11.0***	20.4***
number of household members:				
1	63.5	84.3	20.2	26.2
2	60.2	81.8	12.6	21.8
3,4	51.3	78.4	11.6	12.9
5,+	48.7***	78.0***	10.6***	12.2***
number of friends:				
0	55.4	74.6	14.4	25.0
1,2	56.4	80.3	14.6	19.1
3,4,5	53.8	81.9	14.0	14.7
6,+	54.7	80.1**	10.5***	15.0***
active church-membership:				
no	53.8	80.4	13.2	16.6
yes	58.0***	79.4	12.0	18.3*
membership of voluntary organizations:				
no	57.3	80.6	14.6	20.8
yes	53.3***	79.7	11.4***	14.2***
work outside the home:				
no	67.2	83.0	15.9	27.3
yes	46.1***	77.9***	10.6***	9.6***
number of support-givers:				
0	54.4	72.4	11.0	21.6
1,2	54.0	77.0	14.2	23.2
3,4	54.1	78.6	11.4	15.4
5,6	56.7	83.8***	14.3***	16.7***
Measures of structure of the social network:				
proportion of long-standing relations:				
0	44.9	79.9	12.4	12.0
1-33	51.5	82.0	15.0	12.8
34-67	54.4	82.1	13.8	16.4
68-99	61.1	82.7	12.7	18.1
100	61.3***	77.4***	11.0**	22.3***
proportion of people living nearby:				
0	53.8	78.8	13.8	18.2
1-33	56.0	81.4	13.5	16.1
34-67	55.3	81.9	12.6	16.7
68-99	57.2	83.3	14.2	16.6
100	53.9	77.5***	11.7	17.2

Table 3.1. continued

	Chronic diseases	Minor complaints	Psychiatric complaints	Feeling in bad health
proportion of people with whom one has frequent contact:				
0	57.7	78.0	12.3	18.4
1-33	58.8	80.8	13.1	15.5
34-67	55.8	82.1	13.7	16.8
68-99	58.0	84.6	13.9	15.1
100	51.7***	78.2***	12.0	17.8
proportion of kin:				
0	48.9	79.8	12.7	14.7
1-33	55.4	81.4	14.4	15.2
34-67	58.2	82.1	12.5	17.7
68-99	59.2	81.8	11.7	17.2
100	58.2	76.1***	12.5	22.4***
proportion of colleagues:				
0	55.6	80.3	13.0	17.6
1-33	52.0	81.7	13.6	11.7
34-100	50.9*	82.7	10.4	13.5***
heterogeneity of gender:				
0	55.5	80.8	14.0	17.8
0.01-0.91	55.3	81.0	12.5	15.6
0.92-1.00	54.5	80.2	12.4	17.0
heterogeneity of labour market participation:				
0	54.6	79.0	12.3	17.4
0.01-0.91	56.0	81.8	13.0	15.6
0.92-1.00	53.7	80.8*	13.2	16.9
Measures of social support:				
emotional support, not related to health:				
no	57.1	77.1	10.1	19.5
yes	52.6***	83.9***	16.3***	14.2***
practical support, not related to health:				
no	53.5	78.0	12.2	18.3
yes	56.3***	81.7***	13.3	16.2**
visits, going out:				
no	57.6	78.1	15.1	21.7
yes	54.7*	80.4	12.5**	16.5***
health-related emotional support:				
no	50.5	73.3	8.7	14.5
yes	59.8***	87.2***	17.1***	19.9***
health-related practical support:				
no	53.5	79.0	11.5	15.5
yes	76.0***	94.6***	31.1***	38.5***
social contacts with people working in health care:				
no	56.8	78.9	12.6	20.8
yes	53.2***	81.4**	13.1	13.1***

Pearson's X^2. Statistical significance: *** = p < .001, ** = p < .01, * = p < .05.

Table 3.2. Results of logistic regression analyses for the relationships between chronic diseases, minor complaints, psychiatric complaints or feeling in bad health, and network characteristics, controlled for gender, age and education (N=10,110)

	Chronic diseases	Minor complaints	Psychiatric complaints	Feeling in bad health
Measures of social integration:				
composition of the household:				
one-parent	N.S.	+	+	+
two-parent	N.S.	-	-	-
couple	N.S.	-	-	-
number of household members:	N.S.	-	-	-
number of friends:	N.S.	N.S.	-	-
active churchmembership:	N.S.	-	-	-
membership of voluntary organizations:	N.S.	N.S.	-	-
work outside the house:	-	-	-	-
number of support-givers:	+	+	+	+
Measures of structure of the social network:				
proportion of long-standing relations:	N.S.	-	-	N.S.
proportion of people living nearby:	N.S.	N.S.	-	N.S.
proportion of people with whom one has frequent contact:	N.S.	N.S.	N.S.	N.S.
proportion of kin:	N.S.	-	N.S.	N.S.
proportion of colleagues:	N.S.	+	N.S.	N.S.
heterogeneity of gender:	N.S.	N.S.	N.S.	N.S.
heterogeneity of labour market participation:	+	N.S.	N.S.	N.S.
Measures of social support:				
emotional support, not related to health:	N.S.	+	+	N.S.
practical support, not related to health:	+	+	N.S.	N.S.
visits, going out:	N.S.	N.S.	-	N.S.
health-related emotional support:	+	+	+	+
health-related practical support:	+	+	+	+
social contacts with people working in health care:	+	+	N.S.	-

Coding of variables: composition of the household, one-parent: 1=yes, two-parent: 1=yes, couple: 1=yes, versus living alone as reference group, active churchmembership: 1=yes, membership of voluntary organizations: 1=yes, work outside the house: 1=yes, all types of support: 1=yes. Meaning of symbols: + = statistical significant positive coefficient, - = statistical significant negative coefficient, N.S. = coefficient is not statistical significant, $p < .05$.

If age, gender and education are taken into account, many of the relationships between network characteristics and illness appear to change. In the reverse situation, this is not the case: relationships between age, gender and education, and the occurrence of complaints and diseases, remain when characteristics of the social network are included in the analysis. Older people, women and those with a lower level of education report more complaints and diseases. The coefficients of age, gender and education, corrected on each occasion for one of the network characteristics, have not been shown here because of the lack of space and the fact that they display a high degree of correspondence with the coefficients shown in table 3.3. In the discussion, we shall look at the results mentioned above more closely.

Table 3.3. Logistic regression coefficients for the relationships between chronic diseases, minor complaints, psychiatric complaints or feeling in bad health, and gender, age, and education (N=10,110)

	Chronic diseases	Minor complaints	Psychiatric complaints	Feeling in bad health
gender	$-.39^{***}$	$-.57^{***}$	$-.58^{***}$	.03
age	$.03^{***}$	.01	-.01	$.03^{***}$
education	$-.06^{***}$	.01	-.05	$-.22^{***}$

Coding of variables: gender: 1=male, age: continuous, education: 1=low through 5=high. Statistical significance: *** = p < .001, ** = p < .01, * = p < .05.

3.4. Discussion

In this chapter, a description is given of the relationships between characteristics of social networks and health for a representative random sample of the Dutch population. Network characteristics can be grouped into three categories: characteristics of integration, structural characteristics of the network and characteristics of the content of the social relations. The characteristics of integration show a consistent pattern of relationship with indicators of illness: people who are more integrated also appear to be more healthy. Even when account is taken of age, gender and education of the respondents, it shows that people in larger households, with more friends, who are active members of a church or members of voluntary organizations, or who work outside the house, report fewer complaints and diseases. This accords with the findings of other researchers (Bland et al. 1991). The more objective measure of health, chronic disease, is not always related to characteristics of integration anymore after socio-demographic characteristics are taken into account.

If integration is indicated by the number of support-givers available to a person, then it appears that there is a positive relationship with illness: people who have more support-givers are more often sick. On the basis of the literature one would expect that people who have more support-givers would be less frequently sick. We assume that the operationalizing of the number of support-givers is to blame for this. The number of support-givers has been calculated with the assistance of questions concerning the receipt of specific types of support; a need for support in one of the areas of concern must thus exist if the respondent is to respond positively to these questions.

The results for the functions of social relations, social support, can be interpreted in the same way. If no account is taken of gender, age and education, the receipt of general emotional and practical support, and also social companionship and the availability of information on illness, often relate negatively to the occurrence of chronic diseases in particular. Multiple analyses, where account has been taken of the socio-demographic characteristics mentioned, show that these relationships are no longer statistically significant or even positive: receiving support relates more often to a higher occurrence of complaints or diseases. As far as health-specific types of support are concerned, where we also find these results, it appears that the reason is clear: the more sick a person is, the more he or she needs support. This is what Schwarzer and Leppin (1991) call "mobilization" of support. Therefore, a better way to analyze relationships between social support and health may be on a selection of respondents. When only respondents who have been in need for a specific kind of support are selected, we expect that people receiving more support will be more healthy.

The results in respect of relationships between health and the structural characteristics of social networks, such as the proportion of kin, long-standing relations or frequent contact in the network, do not afford clear conclusions. Most of the results, in particular those tested on a multiple basis, do not achieve the level of statistical significance. A reason for this could be that the effects of structural characteristics on health are displayed via the receiving of support (Wellman and Wortley 1989, Haines and Hurlbert 1992). Because people have more long-standing relations in their network, they are more able to rely on support (these relations are in particular more obliged to give support than short-term relations, because of the great degree of mutual investment). And the feeling of receiving more support would lead to less illness (Berkman 1985, Haines and Hurlbert 1992). Another reason might be that relationships between structural characteristics and health are not linear. Thus, not the proportion of people of any kind is important to health, but some specific amount. The bi-variate analyses already suggested something like this, in particular with regard to the proportion of long-standing relations and of people with whom one has frequent contact. Future research is needed to achieve greater clarity in this.

Age, gender and education appear in a large part to determine the relationships between health and the social network. The relationships of these socio-demographic characteristics with illness are also much stronger than the relationships between network characteristics and illness. When a network characteristic is added to the analysis of relationships between socio-demographic characteristics and illness, the coefficients of these socio-demographic characteristics scarcely change. These results have important consequences for research into relationships between network characteristics and health: socio-demographic characteristics are a factor that may not be neglected.

We conclude by stating that social networks do not seem to be particularly important for health. Different types of social network characteristics are related to health in different, but not very strong, ways, and these relationships are also influenced by socio-demographic characteristics differently. Since our sample is heterogeneous in several respects and our data is cross-sectional, effects may interact: social networks may influence health, but health may also influence the social network. Especially with regard to characteristics of social integration as having work outside the house and membership of organizations one can imagine that serious illness will limit the opportunities for contact. To separate different types of effects one needs to select groups of respondents in specific situations and determine relationships between characteristics of the social networks and health for them.

Another limitation of this study is that all data were obtained via the respondent. The indicators of illness could accordingly be a reflection of perceived complaints and symptoms as well as of diagnoses. It may be assumed that the socio-demographic characteristics used here have influenced the reporting of complaints (Van der Zee 1982). Future research must show whether our conclusions are also valid if "objective" measures of illness are used. We conclude that the relationships we found between social integration and the more subjective measures of health appeared to be relatively strong. The report of chronic diseases, a more objective measure of health, does not hold strong relationships with characteristics of social integration. Apparently, the subjectivity of the indicator of health is important for research into relationships with social networks.

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4. Network characteristics and health status: towards integration of mechanisms

4.1. Introduction

In the last two decades, research on the effects of social networks on health has grown rapidly. In early days, Durkheim (1897, see for review House, Landis and Umberson 1988) drew attention to the relationship between social integration and suicide. A large increase in number of publications on possible relationships between health and the social network emerged since the intriguing articles of Cassel (1974) and Cobb (1976) on health and social support. The number of articles on social support in the Social Science Citation Index was only 2 in 1972, in 1980 4, and reached 100 in 1984. Ever since, this number fluctuates between 120 and 140[1]. On the topic of relationships between social networks and health, the SSCI may not be a very good source. In 1985, only 5 out of all 122,169 articles in the SSCI covered this topic (0.004 %). A better source may be found in Medline, a collection of articles gathered by the National Library of Medicine. In 1985, 34 (0.011 %) publications on the topic of social networks and health status were covered. This number has expanded to 65 in 1992 (0.016 %). In the database of the American Psychological Association (PSYCLIT), the number of articles on the topic of social networks and health expanded from 3 (0.02 %) in 1974, to about 200 in 1989 (0.53 %).

Notwithstanding the increase in the number of publications, results of research about the effects of network characteristics on health status seem rather unclear. With regard to mental health, most researchers find a clear effect of network characteristics on health status (Leavy 1983, Kessler and McLeod 1985). But with regard to physical health such effects are less pronounced and less consistent (Schwarzer and Leppin 1991). Whether effects are clear or not, questions as to why social networks are related to health have remained largely unanswered. A great deal of work has been done in the field of "social support" as a response to the earlier mentioned articles of Cassel (1974) and Cobb (1976). The central hypothesis of these researchers is that social relations buffer or moderate the potentially deleterious health effects of psychosocial stress via social support (House, Landis and Umberson 1988, p. 541). Others showed that social relations had more direct effects (regardless of stress) on health (i.e., Berkman and Syme 1979, Blazer 1982, House, Robbins and Metzner 1982, Reed et al. 1983, Orth-Gomér and Johnson 1987). For some time, it was argued that either buffer or direct effects could exist (for a discussion, i.e., Thoits 1982, Cohen and Wills 1985, Alloway and

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[1] The number of articles on social support started to grow just after a general growth in number of publication in the SSCI. The total number was 73,150 in 1972. In the seventies this number increased considerably, to 122,205 in 1980, and 121,428 in 1984. Since then, the total number of publications each year remained approximately 120,000.

Bebbington 1987, Lin and Ensel 1989, Buehler and Legg 1993). But reviews showed that direct effects tend to be found when measures of integration are investigated, and that buffer effects are found when support is measured by the availability of resources that help one respond to stressful events (Cohen and Syme 1985, Cohen and Wills 1985, Israel and Rounds 1987, Van Sonderen 1991). Still, we do not know why social support may buffer stress, or why social relations may have health-promoting effects. A good description of several possible mechanisms can be found in the work of Berkman (1987), Ganster and Victor (1988), House, Umberson and Landis (1988) and Cohen (1989). The pathways leading from social networks to health suggested by these authors can be distinguished into two groups: 1) behavioural mechanisms: a) individuals in a social network are constrained to behave like other network-members, also with respect to health behaviour, and they may be encouraged by members of their network to engage in healthy behaviour; b) through the provision of emotional support, information, advice, services, tangible and economic support, some networks provide for better (medical) care of their members than other networks; 2) psychological mechanism: the perception that others will provide support when needed leads to positive affect and a better psychological state. People who are lacking this perception may experience their situation as stressful. Some individuals may then respond with a changing psychological state (becoming depressed or fatalistic, for example) and the psychological state may lead to alterations in physiological patterns.

These mechanisms have not been studied systematically yet. We want to make a start by highlighting the research on specific mechanisms in this article. We also want to reduce the heterogeneity in theoretical formulations as observed by Schwarzer and Leppin (1991). We argue that there is a common idea behind at least two possible mechanisms. This is the theory of social capital (Bourdieu 1980, Flap 1988, Coleman 1990). We argue that the two behavioural mechanisms fit in this sociological theory[2]. Not mentioned yet is another mechanism that leads from health status to social networks[3]. Several authors have studied this relationship (i.e., Lyons 1991, Janssen 1992). We add this relationship in our discussion of mechanisms in terms of social capital. The remainder of this article consists of a description of a theory of social capital and how the behavioural mechanisms mentioned above and the mechanism from health to social

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[2] For now, we leave the exploration and theoretical development of the possible psychological mechanism to others. Although a large bulk of literature is neglected by this choice, we feel that this mechanism does not fit in the theory of social capital. We could not fit such psycho-physiological changes in terms of our social theory. This line of research seems to have potential for collaboration between workers in the field of social networks and in the field of medicine.

[3] Also not mentioned yet is the (little) literature on the spread of infectious diseases via social networks (i.e., Klovdahl 1985).

networks are implied by this theory. Subsequently, we will review some of the research literature that has dealt with each of the mechanisms along the lines of our theory[4].

4.2. Theory of social capital

The theory of social capital indicates the importance of social relations for someone's functioning in terms of life chances. Recently, the notion of social capital has been developed (Bourdieu 1980, Flap 1988, Coleman 1990) and its implications tested (e.g., De Graaf and Flap 1988, Coleman 1988, Broese van Groenou 1991, Boxman 1992). People in western societies have access to several sorts of capital. Apart from economical, cultural and political capital, people have access to social capital. The concept of social capital refers to the resources one has not access to directly, but indirectly through ones social network (Lin 1982, 1992). In order to achieve their goals, people can use all these sorts of capital. People having access to more capital, or resources, are better able to achieve their goals. People obtain social resources by investing in building, expanding and maintening their social network. Some social relations are endowed by birth, like kin, other relations may be formed because of (mutual) choice. One way or the other, people have to make an effort to maintain or expand their social relations. Reasons for building up a social network not only may be sympathy or direct pleasure, but also the fact that you may need the person in a certain future point in life (Flap 1988). People may also invest in social relations to repay investments made by others in the past. Through contacts with others, people may obtain information, security, emotional support, status and other means to make life more comfortable (Van Busschbach 1992).

The idea of social capital implies that social resources play a role more or less similar to the role that is played by economical, cultural and political resources. Social capital can be converted into material and immaterial "goods" (Bourdieu 1980). But the access to resources does not imply that they are used per se. Social capital is more than a simple count of all people in the network and their personal resources. Social capital is the result of a) the number of people willing to provide support, b) the resources that can be mobilized in this indirect manner, and c) the extent in which these people are willing

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[4] Publications have been gathered by means of the computerized catalogues of SSCI (1981-1991), Medline (1985-1992), PsyClit (1974-1990), the library of the University of Utrecht (1974-1992) and the NIVEL library (1974-1992). Because the number of publications on the subject of social networks and health reached the 100 for PsyClit in 1983, we only kept count since then. We started tracing publications published since 1983 by reading the journals that had published many articles on the subject already, and by means of the so-called snowball method (searching the literature cited in publications already gathered). To mention a few journals: American Sociological Review, Journal of Health and Social Behaviour, Journal of Personality and Social Psychology, Journal of Social and Personal Relationships, Social Networks, Social Sciences and Medicine, Sociology of Health and Illness. Our gathering may not have been comprehensive, but we now have a large number of publications available (over 1,000). Whether we missed anything important may be decided by the reader.

or committed to provide support (Flap 1988). Granovetter (1973) made the important distinction between "weak" and "strong" relations ("ties") that is relevant here. "Weak" ties, defined by less time spent together, less emotional intensity, less intimacy and less reciprocity in exchange of services, are an important means to reach a great amount and more diverse types of resources. At the other hand, "strong" ties will be more willing to provide their resources.

Furthermore, social capital may be goal-specific, which means that the resources of certain social relations cannot be used to achieve any goal. When investments made in a particular relation in the past are not high, the amount of resources asked in return from that person cannot be too high either. And when the other person in the social network does not have specific resources himself, there is no way of delivering that kind to you directly (but sometimes it may be possible to get these resources from other persons in the network of the person in your network: step-two relations).

When people make use of their social capital, these resources may become exhausted while they are used. At a point in time network-members may no longer feel indebted to deliver resources because they foresee no future repayment from a person, and the investments that person made in the relations with these network-members in the past are not high enough to keep them obliged[5].

4.3. Mechanisms in the relationship between network characteristics and health

We will describe three mechanisms in the relationship between social networks and health. The first mechanism concerns the social regulation of health behaviour, through which people may obtain or remain in better health. Secondly, we describe the well-known buffer effect in terms of our theory. And thirdly, we incorporate a mechanism of selection: through a deteriorating health status, the social capital of ill people is influenced.

Social regulation

Social regulation is a byproduct of people investing in each other. In terms of the theory of social capital described above, we assume that people will invest in each other with an eye to the future. The fact that persons share a common future in which they could help each other, and that they also share a past in which they invested in each other, implies that alter and ego depend on each other. Disinvesting is more difficult if

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[5] Exchange in relationships with family and in affective relationships seems to be steered less by investments in the past and future repayment. We argue that also for these kinds of relationships, (expected) reciprocity in investments is important for the appreciation and duration of the contact. Further, in longstanding relationships, it is hard to assess when and to what extent one is repaid, since the number of interactions through time is high (Van Busschbach 1992). People can be repaid years later, or via a third person.

one has invested much time, energy and other resources in a particular relation in the past. This will be even more difficult in a dense personal network, because disinvesting in one "tie" would endanger one's "ties" with others in the network. Not conforming to the norms shared in a network can be considered as a way to disinvest in personal relations and leads to disinvestment in you by others. Social groups share norms with respect to all kinds of aspects of their life. Not conforming to the norms in a dense network may result in loss of contacts. In a dense network, not conforming is more costly, because: 1) you may lose contact with the person who confronts you with the norms, 2) you may lose contact with others in the network, who are closely linked to the one who confronts you with the norms, and moreover 3) you may not be able to engage in new contacts, because you only know the persons in your network, who all know each other but hardly anyone else. In a dense network you will probably not have many "weak ties", through which you could meet others, and which form a kind of reserve pool which can be tapped whenever "strong ties" disappear (Hammer 1983). Thus, when people have invested more in their social network, they will behave more closely in accordance with the norms prevailing in this network (Coleman 1988). This is what we call social regulation.

According to Umberson (1987), the influence of social regulation on health occurs through the facilitation of health practices and the internalization of norms for conventional behaviour, and via regulation, sanctions, and physical intervention. In her empirical work, Umberson does not consider the possibility that prevailing norms with regard to health practices may be health-endangering themselves. Thus, not only social integration as a necessary condition for strong normative regulation is important here, but also the actual contents of the norms which prevail within the network. A dense network enforcing bad health norms will be a greater threat to health then a loose-knit network with better health norms. Use of the theory of social capital adds to the ongoing literature that social regulation is one way of looking at the influence of social networks on health: norms ànd density in the social network may predict health status, not only health behaviour.

Buffer effects

The buffer effect concerns those cases in which support is mobilized. The receiver will experience the support as an investment or as a repayment of (former) investments by others. According to the theory of social capital, people may use the social resources they have built up in the past for achieving momentary or future goals. If their well-being is threatened by stressful events (we see the occurrence of illness also as a stressor), they can reduce the consequences by resorting to their social resources. When people have more social resources and when they make more use of these resources (mobilize these resources), the consequences of stressful events will be less severe or of shorter duration. This buffer effect will not occur or will do so to a lesser degree if the persons to whose resources one has access to are less socially indebted. Because social resources are often goal-specific it is also possible that the support available is of no use in the specific situation at hand. One might suppose that the buffer effect would also be influenced by the availability of professional resources: i.e., when professionals are available, no support from lay network-members is necessary. But, as Litwak (1985, p. 10) states, support by professionals is very often not helpful for problems of every day life. These problems require non-standard solutions, they are unpredictable and pose tasks with many contingencies. Social resources are particularly adequate in case of these problems.

Like Litwak (1985), Cohen and McKay (1984), and Cutrona and Russell (1990), who categorized sources and types of social support according to the specific needs of individuals, we assume that specific types of social support are more relevant to the consequences of some events than of others. The characteristics of the specific events and of the types of social support have to match (Cohen 1988, Cutrona and Russell 1990). A general distinction in types of support can be found in the work of House and Kahn (1985) and Schonfeld (1991). The most frequently used categories are emotional support, practical support, informational support and social companionship[6]. We hypothesize that emotional support (defined as help in defining and coping with problems) is more relevant when an event causes anxiety. An event will cause more anxiety if people do not know much about it, if the event does not occur frequently, or if a specific event cannot be related directly to a specific cause. There is a need for practical support (defined as the provision of material aid) when the event restricts everyday activities. And information (defined as the provision of information on actions to take) is supposed to benefit people who face events that do require professional help, and when the causes of the events are relatively unknown. Social companionship (defined as the provision of feelings of belonging) might influence health or illness directly, but will not be useful in case of stressors because specific types of support and specific events have to match. We consider social companionship non-specific, and not aimed at exchange of any particular kind of support (compare Lin 1986, instrumental versus expressive dimensions of social support). Schonfeld (1991) suggested that when one type of support is explicitly mobilized, a conceptually different type of support often is mobilized implicitly. We will return to this subject in the section on literature on buffer effects.

From the theory of social capital we derived the hypothesis of matching events and support. A further gain of this theory is the notion that, for the buffer effect to take place,

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[6] The reader might be confused by our categorization of support. House and Kahn (1985) use other labels but make a similar distinction as we do. And Schonfeld (1991) uses most of our labels but makes a different distinction. To be clear, we state our definitions as follows:
- emotional support concerns affirmation, feedback, social comparison, defining and coping with problems (called "appraisal support" both by House and Kahn (1985) and by Schonfeld (1991)),
- practical support concerns material aid such as money, labour ("instrumental" support according to House and Kahn (1985) and "tangible" support according to Schonfeld (1991)),
- information concerns advice, suggestion, directives (labelled "informational" support by House and Kahn (1985) and not mentioned by Schonfeld (1991)),
- social companionship provides feelings of belonging (not mentioned by House and Kahn (1985) but might be the same as their "emotional" support (esteem, affect, trust, concern), Schonfeld (1991) labels this type in his categorization in the same was as we do).

resources must not only be available, they also must be used. What this means for the research on buffer effects will be explained in the section on literature on buffer effects.

Selection

To maintain their social network, people have to invest in social relations and to repay prior investments made by others. Fischer et al. (1977) already underscored the influence of all kinds of constraints on the emergence and change of social networks. Illness as such is yet another restraint on network formation. Illness may be detrimental to people's social networks in two ways. First, limitations caused by illness will limit the opportunities for new contacts. Ill people also generally have less resources to spend on others, e.g., money (Fischer 1983). These limitations can also make it difficult for an ill person to invest in his social relations. Because of a growing inability to get to places, to function as before, opportunities for social interaction (to continue shared activities and thereby invest in relations) will become limited when ego develops an illness (Rounds and Israel 1985, Lyons 1991, Stoller and Pugliesi 1991, Janssen 1992). Adams (1967) uses the concept of relations based on concern or consensus in this respect. Social relations based on consensus only, on shared activities, are more likely to disappear as a consequence of the development of an illness than relations based on concern (love, care, e.g., like most kin relations). A further refinement can be made in terms of uniplex or multiplex relations. Relations with people with whom one shares only one type of activity are uniplex relations. Uniplex relations are nearly always based on consensus only. Uniplex and consensus relations (Tolsdorf 1976) are especially vulnerable when one person is no longer able to continue this activity. A second reason for deterioration of people's social networks through illness may be that the credit vested in social relations can become exhausted: the person who has fallen ill requires more investment - social support- from his supporters than he ever will be able to pay back. A relation may break up not only because the supporter is no longer willing to support (because he no longer feels indebted and sees no future repayments for his services from the ill person, see for instance: Rounds and Israel 1985), but also because the ill person does not want to be a burden any longer (Joosten, Van der Horst and De Witte 1986). When an illness or functional limitation is present for a longer period of time, the patient usually develops more limitations and becomes more dependent of others.

Illness does not always impair social networks. It will depend on the number of relations the ill person has been able to keep up in the past combined with the investments made in these relations and the number of interactions between those people one is related to (density), through which people are indebted to each other. It also depends on the nature of impairments people have to cope with because of the illness, these impairments can be more or less severe (see for instance: Lyons 1991). Finally, the type of illness matters: some illnesses cause more anxiety on the side of members of the network of the ill person because they are more life threatening, are progressing rapidly, or have symptoms that are more visible (Janssen 1992), and scare people off (for instance, cancer or aids). We call these last three factors (functional disability, visibility, and threatening nature of the disease) the "social" severity of a chronic disease.

The structural circumstances people live in, indicated by stage of the life cycle, gender and education, are also important for the magnitude of expected changes through the development of a chronic disease. The consequences of a chronic disease for the social network are probably less severe for older people, because they are already confronted with a decline in social contacts through aging (Shulman 1975, Fischer and Oliker 1983). Gender and education also appeared to be major determinants of social network characteristics (see chapter 2, and Marsden 1987). For instance, women report having more friends and more people they can rely on for support than men. People with a lower education also report having more friends but name fewer people they rely on for support than more highly educated people (chapter 2). So, females and people with a higher educational level probably will suffer other consequences from deterioration of health than men and people with a lower educational level.

To develop more specific hypotheses, we distinguish relations in those likely to be accompanied by more or less investments in the past, and in those likely to concern one or more shared activities (multiplexity of relations). Relations of longer duration, usually with kin, have a longer history of investments, and are therefore more likely to continue when someone develops a chronic disease. People with whom one shares specific activities, like colleagues, co-members of organizations, are likely to disappear when someone develops a serious chronic disease because one is no longer able to share these activities and there are no alternatives (goal-specificity). Literature on social networks of the unemployed confirm our suggestion that leaving the work force will result in less social contacts (even with other voluntary contacts, Flap and Tazelaar 1989). Since the ill person is in greater need of social support but is not able to repay these services, only relations will remain with those who have more opportunities to provide support (like people living nearby). An interesting group in this respect are women. In the Netherlands the participation of women in the labour force is rather low, most women stay home most of their time and therefore have more opportunities to provide support. In general, since the patient himself is not able to repay services, repayment may be accomplished by prior investments or by third parties. In dense personal networks, person A may be repaid for something he did for B by C, because B did something for C once. Since people developing a chronic disease are not likely to develop new relations for lack of opportunities to do so, we expect that the personal network in general will shrink. We further expect that once a person falls seriously ill his remaining personal network will become more dense, because all network-members except for those especially tightly knit will soon withdraw.

To sum up, we hypothesize that the personal networks of ill persons will deteriorate the longer their illness lasts, because a) either the ill person or the network-member will break off an existing contact since there were fewer investments in the past, which results in less feelings of debt on the side of the network-member, or in a growing imbalance in the relation (and both the ill person and the network-member tend to avoid unbalanced relations), or b) the contact is lost since the ill person shared activities with the network-member that he or she is no longer able to perform, or because c) people with a chronic disease have fewer opportunities to make new contacts. Further, we hypothesize that the remaining part of the personal network will increasingly be characterized by a dense core consisting of people with whom one has long-standing relations, with whom one shares several activities, who are more available in terms of time to spend and to travel.

Our theory gives us reasons why social networks will change through the development of an illness, and makes clear what social relations are particularly vulnerable to this process. In the next section we will describe research literature that has empirically explored (parts) of our theoretical notions.

4.4. Literature on mechanisms

The publications reviewed below were selected on grounds of their research-question, sample design and measurements of network characteristics. For the mechanism of social regulation we searched for publications on norms in the social network with regard to health or health practices. Since these publications are very rare, we also describe studies that incorporate measurement of health practices in studies on the effects of social integration on health. The number of publications on buffer effects of social support allow us to be very strict in selecting the research described here. We are not interested in studies that investigate the often used interaction effect of events and support. We believe the central issue of the buffer effect is: does support buffer in case of events? Consequently, we selected studies that investigated samples of people under stress. A further selection concerned the measurement of support: we selected only those studies that incorporated several types of support, preferably (but not only) the types we described in the section on buffer effects in terms of the theory of social capital. For the effects of health on the social network we selected studies that make clear whether and why the network changes. Since many of the publications concern reviews in which the authors do not fully describe sample and measures used, or concern case-studies which are hard to generalize on, the selection leaves only a few studies. We must state clearly that we describe all studies here that have investigated relationships between health and the social network more or less along the lines of our theoretical notions, whether their results are in accord with our expectations or not. In each literature section we describe the studies that are most in line with our theoretical notions at last.

Literature on social regulation

We have theoretically explored the idea of effects of social relations on health via regulation of health-related norms. In this section we discuss research on the concept of social regulation. Several studies incorporated measures of health behaviour as risk factors for mortality (i.e., Berkman and Syme 1979), some also showed relationships between measures of the social network and health behaviour (i.e., Berkman and Breslow 1983). In research on families (Bott 1957, Campbell 1991, Doherty 1991) moral education through family-members is often a key concept, and also in research on compliance to medical regimens there is often attention for social regulation (Levy 1983, Mermelstein et al. 1986). But the pathway from norms in the network to health has not been under investigation yet as far as we know. Therefore, we will also describe studies on influence of personal relations on health behaviour.

Like Berkman and Breslow (Alameda County Study, 1983), Gottlieb and Green (1984) report that more social integration is related to better health behaviour. An advantage of the Gottlieb and Green study for our discussion here is that they also report relationships between specific types of health behaviour and specific types of integration. Berkman and Breslow (1983) only report results of indices of integration and health behaviour, therefore the mechanism behind this relationship remains unclear. Gottlieb and Green (1984) interviewed a representative sample of 3025 adults (aged 20 to 64) in 1979, and selected the healthy persons (N=2,473) for their study on health behaviour. Their measures of social integration include marriage, contact with family and friends, church-membership, and membership of voluntary organizations. Health behaviours included in the study are exercise, smoking, (over)weight, alcohol consumption, and sleeping pattern. In all analyses, effects of life events, age, income and education are taken into account. Gottlieb and Green report that married people smoke less often or are ex-smokers more often (both goes only for females). Married males drink less and exercise less than their unmarried counterparts. People with many contacts with family and friends participate in exercise and sleep well more often (for both males and females). Members of church appear to smoke less often, or are ex-smokers more often, and drink alcohol less often (this applies to males only). Female members of church appear to be overweight more often than female non-members. Female members of voluntary organizations participate in exercise more often and are less likely to be overweight than females who are not members of a voluntary organization. The authors suggest that the relationship between health practices and social network characteristics could be a function of social control or religious teachings. Gottlieb and Green also tested in this investigation whether social networks have an influence on health status in addition to their effects through the health practices. Health was measured in two ways. Respondents were asked to rate their health on a four point scale from "poor" to "excellent". The functional health status was measured by combining items for limitations of activity, ability to perform routine activities of daily living, number of days in bed from injury or illness, and energy level. Respondents who reported the life events of serious personal illness or injury were not included in the analyses. Neither membership of church or voluntary organizations, nor marriage had an independent effect on the health status measures of males or females. More contacts with family and friends was related to a higher health rating for females only. These analyses were controlled for (other) life events, age, income and education, and the health practices under study. What Gottlieb and Green failed to show are relationships of the network characteristics with health measures without taking health practices into account. Because they do not show the effects before taking health practices into account, they cannot state anything about changing effects of social networks on health when health practices are taken into account. Therefore, their suggestion that most of the effects of the social network on health are likely to be mediated by health practices does not hold on the basis of their research. Nevertheless, their analyses clearly show that social networks and health behaviour are related. This gives some support for the mechanism we proposed.

In a later study, Gottlieb and Baker (1986) tested hypotheses on the origins of good health behaviour. They made a distinction between three types of origins: 1) socialization (measured for instance by health behaviour of the parents as reported by the respondent); 2) network (measured for instance by health behaviour of peers as reported by the respondent); and 3) individual health beliefs (measured for instance by health locus of control). The health behaviours under study comprised smoking, alcohol consumption and exercise. Survey respondents were participants in university conditioning classes (aerobic fitness, N=659), academic health education classes (student courses, N=86), and a community fitness program (consisting of physiological testing and counselling, lectures and aerobic exercise, N=817). Because of self-selection of subjects into the health intervention programs, the authors warn for limited generalizability of the results. Nevertheless, this study "provides insight regarding the determinants of health behaviour for those who are motivated to become more physically fit." (Gottlieb and Baker 1986, p. 925). The health behaviour of peers appears to have the strongest relationship with one's own health behaviour. Again we see that social networks and health behaviour are related.

A number of studies investigate the influence of family and peers on health behaviour (see for instance Kniskern et al. 1983, McAlister, Krosnick and Milburn 1984, Gottlieb and Chen 1985). We do not describe this large amount of literature here. Instead we summarize them in stating that health behaviour of parents, siblings and friends ("significant others") repeatedly are reported to influence the behaviour of the focal person. For instance, one is more likely to smoke when peers smoke (Kniskern et al. 1983), and more likely to exercise when parents exercise (Gottlieb and Chen 1985).

A study on the social regulation of health behaviour within the family is reported by Umberson (1987). She focuses on marriage and parenting because "... 1) intimate ties, like marriage, have been shown to have a greater impact on mortality than other, less intimate ties, and 2) marriage and parenting are examples of primary group ties, a traditional focus in studies of the effect of social integration on the individual." (Umberson 1987, p. 308). She hypothesizes that married people and parents exhibit fewer health-compromising behaviours than unmarried people and people without children, and that marriage and parenthood have additive effects on health behaviours such that married people with children exhibit the lowest levels of health-compromising behaviours and childless unmarried groups exhibit the highest levels. These hypotheses are tested on data from a national (US) sample of 1826 respondents, collected in 1974-75. Those never-married were excluded because parenting information was not collected from them. The measures of health behaviour included a scale of risk-taking (for instance, the propensity to become involved in arguments and fights), an orderly lifestyle scale (for instance, sleeping and eating pattern), a drinking problem scale (for instance, items on drinking more than intended), a measure on the combination of drinking and driving (frequency), the use of alcohol or other drugs when one is upset, and marijuana use. All analyses were controlled for age, education, income, sex and race. Results show that marital as well as parental status have a deterrent effect on health-compromising behaviours. Further, the presence of children in the home has more effect on health behaviours, than simply having had children. In more detail, having a child at home is related to less marijuana use, fewer drinking problems and less driving after drinking. Being divorced is related to more drinking problems, more driving after drinking, more use of alcohol or other drugs when one is upset, more risk-taking and a less orderly life style. Married men living with children are less likely than any other category of men to engage in negative health behaviours. Women are less differentiated by marital or parental status in this respect than are men. So, overall, marital and parental status seem to affect health behaviour is such a way that married adults with children behave in the least health-compromising way. This suggests that norms shared in the family play a role.

Exactly how social control operates is reported by Umberson in 1992. She conducted a national two-wave panel survey in 1986 (N=3,617) and 1989 (N=2,867). First wave data were used to test hypotheses on gender and marital status differences in social control of health behaviour, and agents of social control. Data from both waves were used to test hypotheses on attempts to change health behaviour, and on effects of changes in marital status on health behaviour. For our purpose we only report results on the first wave data here. To measure social control, she asked respondents to report how often anyone told them or reminded them to do anything to protect their health. Health behaviours included in the study are Body Mass Index (weight related to height), alcohol consumption, smoking, usual daily hours of sleep, and physical activity. Analyses were controlled for race, education, age and income, and separately performed for males and females. Unmarried men report less social control than married men. Unmarried women in the age of 20 to 40 report more social control, and unmarried women in the age of 50 and over report less social control than married women in these age groups. Women, married as well as unmarried, report a greater variety of types of persons who attempt to control their health behaviour than men, but most often these control-agents are of the female gender.

The studies described above all suggest that there is a mechanism of social regulation at work when it concerns health behaviour. Whether this mechanism forms an explanation for the relationship between social network and health remains to be seen. We have found no study that might directly corroborate or reject this.

Literature on buffer effects

The literature on buffer effects has long been connected with the discussion of whether buffer or direct effects are more prominent. "The buffer argument suggests that stress does affect some individuals severely, but that others who possess social support or other coping resources are relatively resistant to the deleterious effects of stressful events. Direct effects of social support occur where health is improved or maintained, independent of respective stress levels." (Schwarzer and Leppin 1991, p. 100). Direct effects tend to be found when the support measure assesses a person's degree of integration in a large social network, and buffer effects are found when in specific situations the support that one needs is given (Cohen and Wills 1985, Ros 1990). The direct effects may then be seen as the outcome of the psychological mechanism, or as the mechanism of social regulation. The buffer effects, as most researchers agree now, takes place when social support is taken into account.

Before discussing the literature on buffer effects with regard to the functions of social support, perceived availability of support must be distinguished from the activation of support when needed. "Perceived support may be most important under normal, everyday circumstances where people can usually cope on their own or have to rely only to a limited degree on others' help. The general sense that one is loved and cared for by others and that these others would help once they are really needed should contribute to psychological and physical well-being." (Schwarzer and Leppin 1991, p. 102). Schwarzer and Leppin further argue that perceived support reflects general expectations, they refer to this kind of support as "cognitive". And the activation of support, although usually measured by self-reports of receivers, is called "behavioural social support", as it reflects more concrete experience in specific situations. With regard to cognitive support Schwarzer and Leppin, in a meta-analysis (1991), report a buffer effect on physical symptoms (-.11). But for behavioural support, they report that this had a positive correlation with symptoms (+.12). They suggest that this positive correlation, called a mobilization effect, may be due to the prior stress-period being the eliciting cause of both support and complaints. The signs of the correlations may reflect the time frames of all variables. Cutrona and Russell (1990) also presented a theoretical model on matching of types of events and types of support. Our work on buffer effects differs from their review study in several respects. The major difference between their work and ours is that the definition of matching they employ does not yield the notions of general perceived ("cognitive") or explicitly activated ("behavioural") support. In fact, in reviewing the literature they do not mention this aspect in the measurement of support, whereas we see this as a crucial point. Stress and illness combined may mobilize support, which in turn helps to facilitate recovery (buffer) from illness at a later point in time. With the help of the theory of social capital we hypothesized that, for a buffer effect to take place, available resources must be used (mobilized) and match with the need raised by the stressor. Since behavioural support refers to concrete situations and general expectations do not, we limit the studies to be described to those concerning this type of support.

We will now describe studies that tested the hypotheses on buffer effects. We have selected studies that examine whether specific types of behavioural support buffer the effects of events (life events as well as the more chronic stress condition of disease) on illness, rehabilitation and well-being. We learned from the above that the measurement of support, and timing of measurement is very important in establishing buffer effects of this kind. Therefore, we will pay specific attention to these matters in the descriptions that follow.

A specific kind of stressful situation, work stress, formed the setting for the first two studies described here (Ensminger and Celentano 1988, Dooley, Rook and Catalano 1987). Ensminger and Celentano (1988) interviewed 133 parents of children under 16, who were continuously unemployed for at least one year following the time they first received unemployment benefits. Then another 135 persons who re-entered employment during the year, and 92 community "controls" (living on the same block as one of the unemployed, of the same sex, also a parent, and continuously employed) were interviewed. Three support measures were used: 1) whether they had someone to whom they could confide personal problems, 2) whether they talked with someone about work, and 3) whether the respondent wished to know more people. Ensminger and Celentano examined the relationships of social support with psychological symptoms (measured by items of the General Health Questionnaire) for the people who were continuously unemployed, because these people are supposed to be under particular stress. In addition to social support and active membership of community organizations and church, the regression equation also contains measures of financial strain, coping with parental problems and hostility (being easily upset). All analyses were controlled for income, sex, age and race. None of the social support measures appeared to buffer the stress of unemployment on psychological problems. More financial strain, more hostility and not showing parental problems to others (one of the coping items), appeared to be related to more psychological symptoms. Thus, social support did not buffer the effects of unemployment on psychological symptoms.

Dooley and others (1987) measured work stress more specifically by a checklist on desired and undesired job and non-job life events. Social support was also measured as relevant to job or non-job matters. Non-job social support items all concerned knowing particular people who could provide support. Among the items on job support there was one on perceived willingness of others to support, the other items also concerned knowing particular people. Another measure of social support used here was whether they had sought help for any emotional problem (called utilization). Interviewed by telephone, (co-) principal wage-earners were asked about these and other matters (N=3,723). Effects of undesirable job-events on psychological symptoms (measured by 25 items) were supposed to be buffered by job-related support, and non-job support was supposed to buffer undesirable non-job events. All analyses were controlled for age, gender, ethnicity and socio-economic status (a combination of education and occupational level). Buffering effects were also hypothesized to exist for perceived and objective security about the job. Perceived job security was measured by expected change in employment for the worse, and objective job security was measured by employment rates for the sector the respondent worked in. Regression analyses showed that undesirable job events had more effect on symptoms for people with more non-job support, and that undesirable non-job events had more effect for people with less non-job support. Support on the job showed no significant buffer effects. These results partly support our hypotheses on buffer effects: non-job support buffers effects of non-job events on psychological symptoms, but this type of support also buffered effects of job-events which is in contradiction with our ideas.

Another stressful situation which has been studied is divorce. Buehler and Legg (1993) examined buffer effects of global support, sources and functions of support on the relationship between life events (a list of 22 items) with psycho-emotional well-being (emotional affect and self-esteem) or psycho-somatic symptoms (9 symptoms, like sleeplessness, headaches and indigestion) on a sample of 144 recently divorced women with children under 19 years of age. Global support was measured as the number of sources of support. Sources of support were divided in kin, formal mental health care, technical (attorneys, books), associates (other divorced persons, colleagues, former spouse), friends, and children. Measured types of support included esteem support, social companionship, instrumental support, and support for intimacy and sexual needs. The analyses were controlled for education and a need for support on six topics ("In which of the following do you currently need assistance?", p. 29, the topics paralleled the support types). Results show that global support buffers the effect of life events on psychological well-being, but not on symptoms. Support from formal mental health care buffers for well-being, and support from kin and friends has buffering effects on psychological symptoms. More interesting are the buffering effects of specific functions of support. Esteem support as well as social companionship appear to buffer effects of life events on well-being, and esteem support also buffer these effects on psychological symptoms. These results give some support for our hypotheses.

The next three studies refer to illness as a stressful situation (McLeroy et al. 1984, Ros 1990, Glass and Maddox 1992). The study reported by McLeroy et al. (1984) concerns 393 stroke cases. These patients were interviewed several times over a period of 6 months after the onset of the stroke. The dependent measure in this study was the ability to perform a number of daily activities (ADL) at 6 months after stroke. At 3 and 6 months post onset of the stroke data on a number of social network characteristics were collected, e.g., whether the patient had received emotional support by type of provider, whether he or she had received assistance with daily activities, and information received by the patient to cope with problems resulting from the stroke. Controlling for all kinds of indicators of severity of the stroke (such as mental functioning, number of days in the hospital) and for demographic characteristics (such as gender, age, education, employment status), regression analyses were performed to estimate the effects of types and sources of support. Affective support from physicians and nurses at 3 months post stroke appeared to have opposite effects on ADL at 6 months: affective support given by nurses was related to less abilities to perform daily activities whereas this type of support received from physicians was related to more abilities to perform daily activities. The only other network characteristic that was related to ADL was instrumental support: the receipt of more instrumental support was related to less abilities to perform daily activities. Affective support from informal network-members as well as informational support was not related to ADL. The authors argue that ADL does not cause the receipt of instrumental support because they controlled for the patient's ADL status just after onset of the stroke. Instead they suggest that instrumental support causes a lower ability to perform daily activities: people's attempts to help the stroke patient deprives the patient of opportunities to develop better performance himself. To conclude, this study does not provide strong evidence in support of the buffer hypothesis. Effects of affective support of professionals are mixed, and instrumental support is related negatively to abilities to perform daily activities.

The sample of Glass and Maddox (1992) consists of a panel of 46 patients who were admitted to hospital with a first stroke. Stroke severity and level of consciousness of the respondents were assessed by physician's assistants. Changes in functional status were measured by a list of activities of daily living collected at 5 days, 30 days, 3 months and 6 months after onset. Received social support in three dimensions, emotional, instrumental and informational support, was assessed by a self-administered questionnaire presented to the patient at 1, 3 and 6 months after onset. Repeated measures MANOVA ("growth-curve" models) was used to examine the impact of social support on changes in functional status. Results show that the impact of social support does not appear during the first month of rehabilitation. Patients reporting higher levels of emotional support showed greater improvement later in time. Instrumental support affects improvement strongest when provided in moderate amounts. The effect of informational support is mediated by disease severity, but in what way remains unclear. Nevertheless, this study shows results in favour of the hypotheses on matching types of events and support in that specific types of support are adequate at different points in time.

Ros (1990) conducted a longitudinal study on adaptation through social support in cancer patients. 60 patients with inoperable lung cancer completed a self-administered questionnaire three times: the first just before therapy started, shortly after the diagnosis is made, the second one month after the start of treatment and the third three months thereafter. Adaptation was defined as well-being and measured by a scale of perceived quality of life and lists of psychological complaints (anxiety and depression). Duration of survival was also used as measure of outcome. Social support was distinguished in two types, emotional and informational support, and a measure of global support (emotional or informational). These types of support were related to their source: partner, family and friends, or from physicians or other caregivers. Relationships between social support and well-being were examined for the group as a whole as well as for patients with more or less physical complaints or with a specific type of coping behaviour (helpless and emotional, or rational and active). In the entire group of patients, relationships between social support and well-being are rare. But in the phase of diagnosis and treatment, informative support given by physicians is related to a higher sense of quality of life and less depression. Informative support given by partner, family and friends in this phase is accompanied by more feelings of anxiety, especially for patients with many health complaints. Three months after treatment the importance of emotional support from partner, family and friends increased, even more so for patients with few health complaints. In the group of patients with few health complaints Ros reports that informative support by partner, family and friends, and emotional as well as informative support by physicians and other caregivers is related to a higher sense of well-being. For patients who are more inclined to perform actively and rationally, more information relates to a higher sense of quality of life and less depression, and for patients who are inclined to react helplessly and emotionally, more emotional support relates to a higher sense of quality in life and less depression. A longer survival is associated with more informative support of physicians and other caregivers. This last study strongly supports the hypotheses on buffer effects.

The studies on buffer effects described here provide mixed results with regard to the hypotheses we developed. With regard to job stress or divorce, we cannot conclude that different types of support have different effects on illness. Two of the last three studies, on illness as stressful circumstance, are most positive about differential effects of types of support. And the circumstances of the people in these studies are stressful without any doubt.

Literature on selection

The literature on effects of health status on the social network is very diverse since every study captures different illnesses. Mental illness (Brugha et al. 1982, Greenblatt, Becerra and Serafetinides 1982, Cutler and Tatum 1983) and more specifically Alzheimer's disease (Kuhlman et al. 1991) seems to have strong effects on the social network. For physical health, reviews on cancer (Dunkel-Schetter and Wortman 1982), chronic renal disease (Rounds and Israel 1985), and rheumatoid arthritis (Fitzpatrick et al. 1988) also report effects on the social networks of these patients. In general, the social networks of the ill are smaller, more dense, consist of relatively more relations with kin and can be characterized by less reciprocity. A number of studies describe social networks of patients according to severity or duration of the disease (Greenblatt, Becerra and Serafetinides 1982, Cutler and Tatum 1983, Morgan, Patrick and Charlton 1984, Schulz and Tompkins 1990, De Witte 1991, Janssen 1992). Why the social networks of patients are affected by a disease is mentioned in some studies (Dunkel-Schetter and Wortman 1982, Rounds and Israel 1985, Johnson 1991, Kuhlman et al. 1991, Lyons 1991), but few studies try to find evidence for these reasons in their data (Stoller and Pugliesi 1991, Janssen 1992). One of the reasons for deterioration of the social network through a worsening health status, that are reported in the literature, is that patients often do not have enough time or energy to go out or visit friends (Rounds and Israel 1985, Lyons 1991, Stoller and Pugliesi 1991). Depressed individuals also may have fewer social skills making it more difficult for them to establish and maintain social ties (Johnson 1991). Moreover, patients often lose their jobs and therefore also lose contacts with colleagues (Rounds and Israel 1985). Network-members may break-off a contact because they consider the relation as too demanding (Rounds and Israel 1985, Johnson 1991, Kuhlman et al. 1991), or may react to the illness in such a way that the patient feels rejected (Dunkel-Schetter and Wortman 1982). They do not want to stand by and watch their friend die (Rounds and Israel 1985).

Most of these reasons correspond to our hypotheses on selection effects. We will now describe some studies on the effects of chronic illness on social networks. These studies are selected because they describe whether and why the network changes. As stated, many of the publications concern reviews in which the authors do not fully describe sample and measures used, or concern case-studies which are hard to generalize.

The first study we describe here is reported by Brugha et al. (1982). Brugha and his colleagues compared the size of the social networks and frequency of contacts of 50 non-psychotic psychiatric out-patients with 50 matched (on sex, age, marital status and occupation) healthy controls. They interviewed both groups by means of a structured interview, in 1979 and 1980. The results are that patients not only named fewer good friends and close relatives, but also a lower frequency of contacts than the matched healthy controls. Our hypothesis on effects of deterioration of health on the social network seems to be confirmed by this study.

The next study described here, by Johnson (1991), examined the effects of mental health on social relations and also the effects of social relations on mental health. Survey data were gathered twice, by telephone, in 1979 and 1980. The sample (N=2,436) contained mainly females (60 %), though, on the whole, the sample was reasonably representative. As indicators of the social network, number of and contacts with close relatives and friends (labelled by the authors as "primary ties") were included as well as active membership of organizations and church-attendance (labelled "secondary" ties). Mental health was measured by four items on frequency of feeling cheerful, blue, lonely or loved. Analyses were controlled for gender, race, marital status, age, education and income. Using LISREL, the model which included effects of mental health on social networks as well as vice versa appeared to fit the data best. More "primary" ties at time 1 appeared to have a negative effect on mental distress one year later, and mental distress at baseline had a negative effect on "primary" ties one year later. Both effects are not found for "secondary" ties. The authors suggest that the time lag used here (one year) may be too short to be able to identify effects on "secondary" ties. This study shows that the network changes through mental distress. But in contradistinction to what we expected, it was not secondary but primary ties that were affected.

Stoller and Pugliesi (1991) wanted to know whether networks were responsive to changes in health-related needs and how this responsiveness affected the network size. For this purpose, they interviewed a sample of elderly people (aged 72 and over) twice, in 1979 and in 1986 (N=173). The main network indicators in their study were size of the network and the number of task areas in which elderly people received assistance. Health status was measured by physical health and activity limitations due to ill health. Results showed that neither physical nor functional status affect the size of the network at either time. But elderly people with higher levels of impairment received a broader range of assistance. That the task load faced by each informal helper may become more complex is suggested by the fact that elderly people with more functional problems still received a broad range of assistance seven years later, but also reported more unmet needs. This study gives some support for our hypotheses on selection: the more severly ill report more unmet needs.

In a study by Janssen (1992) personal networks of patients suffering from Crohn's disease (N=36) and Ankylosing Spondylitis (AS, N=39) are compared to matched controls (N=44) and followed-up for a period of 1.5 year. Matching was successfully performed on age, marital status and family composition, and unsuccessfully on gender and social class: healthy respondents had a higher social class compared to patients, and most Crohn patients were female (70 %), whereas most AS patients were male (79 %, healthy respondents: 52 %). Patients were interviewed three times, with an interval of six months between each interval. The healthy controls were interviewed twice. Indicators of the social network include size, composition (kin or nonkin, professional versus informal relations), receiving and giving emotional and instrumental support. Duration of the health deviation and perceived disability level were also included in this study. With regard to size, Janssen reports that healthy respondents have larger networks than patients. Perceived disability level and duration of the disease were not related to size. Janssen suggests that it is not the disability level but rather the fact that one is disabled that is related to network size. She further suggests that contacts that were likely to disappear during the disease process, have already disappeared at the time of the first interview, since most of the patients had had the disease for longer than two years. Healthy respondents listed non-kin informal network-members more often than patients. Formal network-members are only mentioned by patients, probably because Janssen asked the respondents only to mention health professionals. The composition of the social networks of patients was not related to disability level or duration of the illness. With regard to support, Janssen reports that healthy persons give more emotional support than patients do, but again there was no relationship between emotional support and duration of health deviation or perceived disability level. Healthy persons also give more instrumental support than patients do. Further, the higher the disability level, the more instrumental support received. The reciprocity in instrumental support in relations is for healthy persons higher than for patients. And although the empirical results on the relationship between reciprocity of emotional support and perceived disability level are mixed, for reciprocity in instrumental as well as emotional support and duration Janssen found a strong relationship: the longer the health deviation exists, the lower the reciprocity. This study strongly supports our hypotheses. Not only do patients have smaller networks, these networks also function differently when compared with those of healthy people.

The last two studies examined some of the reasons for changes in social networks due to chronic illness. The first two studies prove that changes as predicted may be expected. Nevertheless, this line of research needs further elaboration for us to be able to make stronger statements about the value of our hypotheses.

4.5. Summary and conclusions

We argued that there is a common idea behind three mechanisms in the relationship between social networks and health: the theory of social capital. The mechanisms described in terms of this theory are 1) social regulation of health behaviour, 2) buffer effects through matching types of event with types of support, and 3) changes in the network through illness or impairments. We will summarize our theoretical notions and the literature for each mechanism here.

We hypothesized that the so-called "direct" effect of the social network on health is explained by social regulation of health behaviour. When people have invested more in their social network they will behave more according to the norms prevailing in this network. The norms with regard to health prevailing in a network may be either health-promoting or health-endangering. The studies we found in this area of research have not paid interest to the norms in the network yet. There is considerable evidence that network characteristics as peer behaviour, marital and parental status are associated with health behaviour (Gottlieb and Green 1984, Gottlieb and Baker 1986, Umberson 1987, 1992), but the association between social network, health behaviour and health has not been studied properly until now. From our descriptive analyses in chapter 3 we conclude that this line of reasoning has potential, since indicators of integration were related to indicators of health (also when demographic characteristics as gender, age and education are taken into account). But this finding may also be a result of selection: people more seriously ill are less able to preserve their social network. In chapter 5 we deal with the effects of social regulation on health empirically.

The buffer effect of social support has been interpreted by the theory of social capital in terms of matching events and support. This phenomenon, matching of types of events and support, was mentioned by Cohen and McKay (1984) for the first time. An assumption of the theory of social capital is that the resources one has access to are often goal-specific. We hypothesized that for the buffer effect to take place, characteristics of specific events and types of support have to match. This hypothesis has not been studied extensively. Several authors examine effects of specific types of support for people under stress but do not distinguish types of events according to the adequacy of types of support. In the study of Ensminger and Celentano (1988) on psychological symptoms for parents who were continuously unemployed, it is very hard to find out why support does not buffer. Their measures of support contained an item on talking with someone about work. This type of support seems to make a good match with the stress of being unemployed. We suggest two causes for their unexpected results: 1) support is mobilized but has not yet had a chance to buffer as a consequence of the short period of time; 2) unemployed people hardly talk about work, they want to talk about being not at work. The report of Dooley, Rook and Catalano (1987) on work stress is more clear, but does not support the hypothesis on matching. Although the effects of events not concerning work on psychological symptoms are buffered by the matching type of support (also not related to work), this relationship does not appear for the match of work events and work support. On the contrary, the effects of work events are buffered by non-work support. This may be due to the fact that the measures of support used here do not give information on the actual exchange of support. Results of the study on performance of daily activities in stroke patients by McLeroy et al. (1984) are also not in favour of our hypothesis. The receipt of instrumental support was related to less abilities to perform daily activities in their study. McLeroy and others suggest that instrumental support leads to a lower performance, because the help of others deprives the patient from developing his performance himself. Other studies reviewed in the section on literature on buffer effects do report matching of types of events and support (Ros 1990, Glass and Maddox 1992, Buehler and Legg 1993). Only Ros (1990) explicitly developed hypotheses on possible matches. Findings on support in chapter 3 show that sick people are able to mobilize support. Whether this eventually leads to less (severe) consequences, whether the buffer effect takes place, will be studied in chapter 6.

Selection in the social network through illness or impairments is the third mechanism we specified with the help of the theory of social capital. Because of limitations in functioning, opportunities to continue shared activities and thereby invest in social relations will become limited when someone develops an illness or impairment. We hypothesized that the social network will deteriorate the longer the illness lasts. The remaining part of the social network will be a dense core consisting of long-standing, multiplex relations with people who have more time available and live nearby. That the social network is influenced by illness or impairment is shown by the studies we reviewed (Brugha et al. 1982, Johnson 1991, Stoller and Pugliesi 1991, Janssen 1992). Janssen (1992) further showed that healthy people report having more non-kin relations than patients. A longer duration of the illness was related to less reciprocity in social support in her research; people who are ill longer, give less support than people who are ill for a shorter period of time. Other characteristics of social relations as multiplexity, time available and travelling distance have not been studied yet. Neither are the circumstances under which our hypotheses are expected not to hold (or to a lesser degree), like the "social" severity of a disease and life cycle stage. In chapter 7 we will investigate some of these aspects for our data.

On the whole, we conclude that the literature has provided us with some indications for the usefulness of the mechanisms specified. But much research needs to be done before we can be more conclusive. For the mechanism of social regulation of health behaviour we suggest investigating the norms regarding health shared in networks, and the influence of the network on behaving according to these norms. The link between social network characteristics and health in which health practices are accounted for also needs further investigation. Research on the matching between types of events and support, especially with regard to life events, we think would be a fruitful way to elaborate the buffer hypothesis. And with regard to changes in the social network through illness or impairments, future research might focus on network characteristics other than those already investigated, and also on circumstances under which the hypothesis does not hold, like different illnesses and different stages in the life cycle. Further investigation may determine the value of our proposed mechanisms. Each of the next three chapters deals with one of the proposed mechanisms.

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5. Social network characteristics and health: the mechanism of social regulation

5.1. Introduction

The relationship between social support and health or illness has been under study for some years now. This still growing branch of research was initiated in the seventies by Cassel (1974, 1976), Cobb (1976) and Caplan (1974). In earlier days, sociologists, and epidemiologists referred to "social integration", measured by such characteristics as church-membership and marital status, to account for differences in mortality and morbidity (starting with Durkheim 1897; for a review, see House, Landis and Umberson 1988). Two hypotheses have been under study (for a review, see Cohen and Wills 1985). One is that health is enhanced through social support by protecting people from the negative consequences of stress (the so-called "buffer" effect). And the other is that social integration enhances health irrespective of level of stress ("direct" effect). We argue that the question is not whether one or the other effect occurs but rather which mechanisms can be held responsible for these different effects. In this chapter we outline such a mechanism possibly involved in the relationship between social networks and health and interprete it in terms of the theory of social capital. We call this mechanism the effect of social regulation: better health and health practices as a consequence of social regulation of health practices through enforcement of norms in dense social networks. In terms of causal analysis, we hypothesize that the effects of personal network characteristics on health will disappear if we control for health practices, because people in social networks usually share values, with regard to health practices for instance, and because people in social networks are committed to following these rules through their involvement in these networks.

In this chapter we will also test our hypotheses regarding the mechanism of social regulation. When effects of social networks on health are analyzed for people under any level of stress, "buffer" and "direct" effects can not neatly be disentangled. Therefore, the role of social integration will be analyzed as it affects the occurrence of illness, for people without stress. Through this selection it will be possible to find pure "direct" effects of network characteristics. Thus, the leading question for this chapter is: *Can we explain, theoretically as well as empirically, the "direct" effect of social networks on health by the concept of social regulation?*

5.2. The mechanism relating social networks and health: social regulation

Social regulation is a byproduct of people investing in each other. It can be described in terms of the theory of social capital. The theory of social capital assumes that a person's relations and all the resources he gets access to through his social relations are his social capital which he can use to achieve his goals. People will invest in each other with an eye to the future. The fact that persons share a common future in which they could help each other, and that they also have a past in which they invested in each other, implies that alter and ego depend on each other. Disinvesting is more difficult if one has invested much time, energy and other resources in a particular relation in the past. This will be even more difficult in a dense personal network, because disinvesting in one "tie" would endanger one's "ties" with others in the network. Not conforming to the norms shared in a network is a way to disinvest in personal relations. Or rather, others will disinvest in you, not be willing to help you to the same degree if you do not live up to their normative expectations. Not conforming in a dense network may result in loss of all contacts. In a dense network, not conforming is more costly, because: 1) person A may lose contact with person B who confronts A with the norms, 2) person A may lose contact with others in the network, who are closely linked to person B, and moreover 3) person A may not be able to engage in new contacts, because A only knows the persons in his or her network, who all know each other but hardly anyone else. In a dense network one will probably not have many "weak ties", which could allow one to meet others; and which form a kind of reserve which can be tapped whenever "strong ties" have disappeared (Hammer 1983). Thus, when people have invested more in their social network, especially when this network is dense, their behaviour will be more in accordance with the norms prevailing in this network (Coleman 1988). This is what we call social regulation.

According to Umberson (1987), the influence of social regulation on health occurs through the facilitation of health practices and the internalization of norms for conventional behaviour, and via regulation, sanctions, and physical intervention. One of her findings is that there is a higher probability of engaging in health-compromising behaviour in the absence of social regulation. In her work, Umberson does not consider the possibility that prevailing norms with regard to health practice may be health-endangering themselves. Thus, not only is social integration, as a necessary condition for strong normative regulation, important here; but also the actual contents of the norms which prevail within the network. A dense network enforcing bad health norms will be even a greater threat to health then a loose-knit network with better health norms. We assume that a person in a dense network will behave more in accordance with the norms in that network, and we predict that if these norms are not health-endangering or even health-promoting and the network is dense, this person will be in better health.

Health-promoting norms do have a traditional and a more modern source: 1) traditional values of a healthy life emphasizing moderation, or 2) modern values of a healthy life demanding awareness of the body, of eating and drinking patterns and of physical activity. Both types of norms may lead to an improved health. Each type of norm will be more prevalent in a different type of social network: traditional values can be found in traditional social networks characterized, e.g., by church-membership. We expect moderation to be highly valued among the religious Dutch, especially because of the Dutch Calvinist tradition (see for reviews on religion and health practices: Levin and Vanderpool 1987, Schiller and Levin 1988). Modern values will be more prevalent in networks that embrace social contacts in health care. People in social networks with professionals in health care are assumed to know the latest "fashion" in health care and prevention of illness (Langlie 1977) and are assumed to be more aware of good health practices through the example these professionals set for them (Adriaanse, Drop and Halfens 1981, Adriaanse 1988, Dekker et al. 1993). Both kinds of norms will have greater influence on ego's behaviour in more homogeneous and dense networks (Bienenstock, Bonacich and Oliver 1990, Kilburn 1993), as indicated by, e.g., a household consisting of parents and children (Umberson 1987), homogeneity of its members (for instance many kin) and many frequent contacts (Freidson 1973). Thus, because people with religious affiliation, or who have social contacts in health care, will have health-enhancing norms, and because those in more dense or homogeneous social networks will strongly conform to the norms in their social network, we hypothesize that people with modern or moderation norms in dense or homogeneous social networks will be the most healthy.

To test this hypothesis, we first study relationships between health and density or homogeneity of the network, controlled for known factors to be related to disease, like gender, age and socio-economic status, and health practices. Secondly, we introduce the possible norms prevailing in social networks. We study the relationship between these norms and the actual health practices. In the third step of our investigation, we combine these norms and density or homogeneity in the social network in the analyses on occurence of illness. In case effects of these combined social network characteristics disappear after controlling for health practices, we consider the hypotheses on social regulation not to be rejected. If these effects still exist after controlling for health practices, our hypotheses can be considered as rejected.

5.3. Data and methods

To test the hypotheses formulated we use data gathered as part of the national survey "Morbidity and Interventions in General Practice" (Foets, Van der Velden and De Bakker 1992) by means of a health interview. Over 17,000 respondents were randomly selected through the administration of 161 general practitioners. Since virtually the entire population of the Netherlands is registered with a general practitioner and since the sample is quite similar to the Dutch population (Foets and Van der Velden 1990), our sample is representative. The total sample includes 17,047 persons, the response rate is

77 %. Persons of all ages are included, but here we only present findings for persons aged 18 and over (N=10,110), because they can be considered to be more free in choosing their network-members themselves than younger people.

As said before, when effects of social networks on health are analyzed for people under any level of stress, the so-called "buffer" and "direct" effects get mixed up[1]. Accordingly, we excluded people who went through stressful life events in the year before the interview, and who experienced social problems or serious chronic diseases, for all analyses presented in this chapter. Life events were recorded for the year before the interview (Ormel and Koeter 1985) and social problems as experienced at the moment of the interview (Furer and Tax 1987). Life events in our list range from death of a spouse to starting a new career. Social problems range from problems in the relation with a partner to problems with housing. For each list a sum-score of the number of events or problems was constructed. We decided to exclude the people who experienced two or more events or problems on the basis of a review of the literature by Cohen and Wills (1985) in which they conclude that any specific event will not be health-threatening: "It is when multiple problems accumulate ... that the potential for serious disorders occurs." (p. 312). About 50 % of all respondents reported none or only one event, and 67 % reported no or just one problem. The presence of a chronic disease was established with the help of a checklist developed by Van den Bos (1989). For each of 25 diseases the respondent filled in whether he or she suffered from this condition and if so, since when. Prevalence figures for chronic diseases range from 1 to 15 %. The resulting research population consists of 2,305 respondents (22.8 %) who reported no chronic disease, and no or just one life event, and no or just one social problem.

To indicate the occurrence of actual illness we employed three indicators: minor complaints, psychiatric complaints and experienced state of health. Minor complaints experienced during the last two weeks prior to the interview were measured by a checklist, consisting of 45 items, developed by Foets and Van der Velden (1990). The total number of complaints is computed by summing all reported complaints. Of the selected respondents 61.6 % report one or more minor complaints. These complaints range from having a cough to pain attributed to the heart. The measure for psychiatric complaints used here, is the General Health Questionnaire (GHQ-30, Goldberg 1972). The GHQ usually is used as a first stage screening instrument of psychiatric illness[2]. Anyone reporting five or more positive items is a possible psychiatric "case" (Goldberg 1972; Tarnopolsky et al. 1979). In our sample 3.2 % of all selected respondents reported

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[1] This does not mean that effects of social regulation are not at work for people under stress. Investigating effects of social regulation in a population of people under stress asks for very specific measurements of social network characteristics (e.g., direct normative influence of specific members of the network) which we have not available in our data.

[2] Researchers suggest that people with chronic psychiatric conditions are very likely not to be identified by the GHQ, because of the answer-categories (Goodchild and Duncan-Jones 1985, Koeter et al. 1988). People are asked to indicate whether they experienced psychiatric complaints more or less than usual, and when they usual experience these complaints, they score low. The GHQ must be viewed as a measure of health status, compared to a 'normal' status.

five or more positive items. The experienced state of health is measured on a five-point scale (1 = very good through 5 = very bad, recoded to 0 (scores 1 and 2) and 1 (scores 3, 4 and 5)). 3.1 % of all selected respondents experience their health status as not good.

Control variables, which are known to be related to health, are gender, age (in number of years) and socio-economic status. We indicate the socio-economic status by educational level, ranging from 1 (low) through 5 (high). Compared to the total, representative, group, the selected respondents are more often female and younger. There is no difference between the total group and our selection with respect to educational level.

Indicators of health practices are: smoking, alcohol consumption, sports, and Body Mass Index. These health practices are known to exert influence on health status (Belloc and Breslow 1972, Berkman and Breslow 1983, Blaxter 1990). The reason for choosing these practices is that we think they may be influenced by the social network (Umberson 1992). We find support for this assumption in the literature on quitting smoking or drinking (Gottlieb and Baker 1986, Mermelstein et al. 1986, Foshee and Bauman 1992), compliance to dietary treatment (Zimmerman and Connor 1989), and stimulation to become and stay active in sports (Gottlieb and Baker 1986, Zimmerman and Connor 1989). We will not give a full description of these measurements and their scaling. Instead, in figure 5.1, we show what the measurements and scales are and where to find a more elaborate description.

Network characteristics involved in the hypotheses stated earlier are: church-membership, social contacts in health care, and density and homogeneity of the social network. Since density and homogeneity of the social network were not measured directly we use proxies. A first indicator of density of the social network is household composition. People living in a household with others are supposed to experience more attempts to regulate their behaviour than people living alone. All respondents reported the composition of their household in the questionnaire. We categorized all household compositions in four groups: living alone (12.1 %), living in a one-parent family (1.5 %), living in a two-parent family (45.9 %), and living with a partner (but without children, 40.5 %). Some elaboration is needed to describe the other indicators of density and homogeneity of the social network. To delineate (part of) the social network, we used the exchange method (Fischer 1982). There were six name-generating questions, each referring to the provision of a specific type of social support[3]. Respondents were

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[3] The name-generating questions in our survey were: "The next questions deal with a number of things you do together with other people, or for which you make an appeal to others. The questions concern those people not living in the same household as you are. The questions do concern other kin, friends acquaintances, neighbours etc. A. Do you talk with people when you have problems with your health? B. When you have a personal problem, do you talk about this with other people? C. Did you receive any help or assistance from people, with regard to a disease in the last few months? (e.g. shopping, getting medicines) D. Did anyone help you with jobs around the house in the last three months? (e.g., painting, repairing things, cleaning up, cooking) E. When you are away for a longer period of time, do you ask someone to watch the house, water the plants etc.? F. Did you visit anyone last month, or did anyone visit you, or have you been out with people?"

requested to mention the names of maximally three network-members per question, referring to people outside the household. After this, all names mentioned first were listed. If the first names for several items were the same, second names were used so that in total six different names could be listed. The respondent was then asked to give some information on the relations with these six persons, like type of relation and frequency of contact. The homogeneity, indicated by a higher proportion of kin was computed by counting the number of kin named as support-givers, divided by the total number of persons named. Of all selected respondents, 29.3 % name no kin at all, and 14.7 % name only kin. People naming more kin as support-givers are supposed to experience more social regulation than people naming less kin. The proportion of frequent contacts, the proxy for density, was computed by counting the number of frequent (once per week or more often) contacts, and dividing this by the total number of named persons. 7.0 % of the respondents report no frequent contacts with support-givers, and 41.2 % report only frequent contacts. People reporting more frequent contacts are supposed to experience more social regulation because there are more opportunities to regulate their behaviour than for people with less frequent contacts.

Figure 5.1. Measurements of health practices, scaling (occurrence in our sample) and references

	measurement	scaling (occurrence)	references
Smoking	"Do you smoke? If yes, how many (shag, cigarettes, cigars, pipes) do you smoke on an average day?"	0 = never or not anymore (60.4%) 1 = less than 20 per day (31.4%) 2 = 20 or more per day (8.2%)	Foets and Sixma (1991)
Alcohol consumption	"Can you tell me how many glasses you drink per day or week on average?"	0 = life-long abstainer or ex-drinker, (18%) 1 = minimal or mild drinker, (64.7%) 2 = moderate drinker, (12.5%) 3 = excessive drinker (4.8%)	Foets and Van Baar (1993)
Body Mass Index	"Can you tell me your height and how much you weight?"	BMI in kg/m²: 0 = 20-25 kg/m², normal (58.4%) 1 = 25-30 kg/m², moderate overweight (26.9%) 2 = 30 and more kg/m², serious overweight, or less than 20 kg/m², weight too low (14.8%)	Foets and Sixma (1991)
Sports	"Are you involved actively in any sport?" If yes, how many time do you spend on sports in an average week?"	in number of minutes per week (40% participates in sports and most sporters (58.0%) spend at maximum 3 hours on sport)	Foets and Sixma (1991)

Since we also do not have direct measurements of norms regarding health behaviour, we use proxies again: church-membership, and social contacts in health care. Dutch people who consider themselves church-members and who attend church regularly are supposed to value moderation highly. For church-membership, apart from asking whether people consider themselves members of a specific church, we also asked whether they attend that church regularly (31.5 % does). Modern values of health practices are indicated as to whether the respondent has regular social contacts with people working in health care (not included are professionals working in administration). 44.5 % of all selected respondents report that among the persons they meet regularly, there are people working in health care.

5.4. Statistics

Because the distributions of the dependent variables are skewed, we choose to conduct logistic regression analyses (Hosmer and Lemeshow 1989). We transformed each dependent variable in a dichotomy, e.g., 0 = no minor complaints, 1 = at least one minor complaint. A positive score always indicates being in bad health. We expect the coefficients to be negative, because a higher proportion of kin or frequent contacts is supposed to be associated with a lower chance of occurrence of complaints. All coefficients are tested for significance at a one-tail $p < .05$ level, and are non-standardized (B's, as is general in logistic regression). For every table we provide a range of the number of respondents. These numbers differ per analysis in each table due to differing missing values.

5.5. Results

A first step in our analyses consists of establishing effects of composition of the household, proportion of kin or frequent contacts on the occurrence of complaints, without controlling for health practices. In these analyses we entered age, gender and education as control variables. Secondly, we performed the same analyses, but now with the four health practices also taken into account. We show the coefficients for these analyses in table 5.1[4].

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[4] To determine the effects of independent variables on the dependent variable in logistic regression analyses, one usually presents odds ratios. An odds ratio represents, for instance, the chance of suffering from minor complaints for males compared to the chance of suffering from minor complaints for females. In the case of our analyses without controlling for health practices this odds ratio = .64 ($e^{-.45}$), which means that males are 64 % as likely to suffer from minor complaints than females. So, males are less likely to report minor complaints than females. Since this interpretation is rather difficult we choose to show B-coefficients. These coefficients are also not very easy to interprete, but here a negative sign in the coefficient also means a negative relationship with the dependent variable.
A further remark concerns the magnitude of the coefficients. Higher coefficients do not necessarily mean strong and greater effects. To determine the magnitude of the effect one has to calculate the odds ratios. The statistical significance of the effect is indicated in the tables by stars (*). The statistical significance is calculated from the coefficient and its standard error (Hosmer and

Table 5.1. Results of logistic regression analyses to determine associations between A) household composition, B) proportion of kin or C) of frequent contacts, 1) controlled for gender, age and education, or 2) controlled for gender, age and education and four health practices, and occurrence of complaints (non-standardized coefficients, N=2,017-2,283)

	Dependent variables: occurrence of					
	minor complaints		feeling in bad health		psychiatric complaints	
	1)	2)	1)	2)	1)	2)
A) gender	-.45***	-.44***	-.06	.08	-.72**	-.81**
age	-.01***	-.01**	.02*	.01	-.01	-.01
education	.08*	.09*	-.26*	-.21	.04	.05
sports		-.01		-.01*		.01
BMI		.13*		-.15		.10
drinking		-.01		-.21		.09
smoking		.08		-.13		.26
composition of household:						
one-parent family	-.53	-.47	.57	.73	1.43*	1.40*
two-parent family	-.05	-.03	-.46	-.32	.20	.17
couple	.10	.12	-.03	.12	.20	.17
Constant	.46	.31	-3.45***	-2.94***	-3.71***	-4.23***
B) gender	-.44***	-.45***	-.24	-.03	-.69**	-.79**
age	-.01**	-.01**	.02*	.01	-.02	-.01
education	.07	.08	-.28*	-.24	.01	-.01
sports		.01		-.01*		.01
BMI		.13*		-.09		.11
drinking		.02		-.20		-.08
smoking		.09		-.23		.30
proportion of kin	-.22	-.24	.14	.01	.26	.29
Constant	.57**	.41	-3.84***	-3.00***	-3.28***	-3.79***
C) gender	-.43***	-.45***	-.24	-.02	-.68**	-.78**
age	-.01**	-.01**	.02*	.01	-.02	-.02
education	.08*	.09*	-.29*	-.24	-.03	-.04
sports		.01		-.01*		.01
BMI		.13*		-.09		.10
drinking		.02		-.20		.07
smoking		.09		-.23		.30
proportion of frequent contacts	-.14	-.12	-.02	-.08	-.40	-.39
Constant	.60*	.41	-4.74***	-2.92***	-2.74***	-3.22***

Coding: minor complaints (0=no, 1=at least 1), feeling in bad health (0=feeling (very) healthy, 1=not feeling (very) healthy), psychiatric complaints (0=no possible case, 1=possible case), gender (0=female, 1=male), age (in number of years), education (1=low, through 5=highest level of education), sports (number of minutes), BMI (0=normal, 1=moderately overweight, 2=seriously overweight or weight too low), smoking (0=no, 1=less than 20 per day, 2=20 or more per day), drinking (0=not, 1=minimal or mild, 2=moderate, 3=excessive), composition of household in dummies: alone (0=no, 1=yes); couple (0=no, 1=yes), one-parent family (0=no, 1=yes), versus alone as reference group, proportion of kin (proportion between 0 and 1), proportion of frequent contacts (proportion between 0 and 1); Statistical significance: * = p < .05, ** = p < .01, *** = p < .001

Lemeshow 1989).

Virtually all analyses show that controlling for health practices does not change the coefficients for the network indicators much. There appears to be just one coefficient for a network characteristic which is statistically significant in these analyses: living in a one-parent family gives higher chances of being a psychiatric case. This effect of household composition also still exists after controlling for health practices.

We did not expect these network characteristics alone to be related to the occurrence of complaints, but only in combination with health-enforcing norms in the social network. Consequently, we will now test our hypothesis on health practices and network characteristics indicating better health norms.

We expected that people active in church, or people with social contacts in health care, for different reasons, would behave healthier because of healthier norms. These different groups might overlap, in the sense that people active in church also may have social contacts with people working in health care. This group then, is expected to report the healthiest practices. Accordingly, we also conducted analyses for the combination of these two characteristics. Because gender, age and education might mediate the relationships between health practices and the two network indicators of healthy norms, we decided to conduct logistic regression analyses (because the distribution of the dependent variables was skewed) in two steps, first without and next with the variables in control taken into account. These analyses are shown in table 5.2[5].

As expected active church-membership is related to less smoking and less drinking. Having social contacts in health care is related to a healthier BMI and participating in sports more often, but these results disappear when gender, age and eduation are taken into account. Table 5.2 further shows that the result that people active in church participate in sports less often is partly due to the effect of age and education, but not totally.

The results for the combinations of these two network indicators of norms are also shown in table 5.2. Being active in church in combination with having social contacts in health care is related to lower chances of smoking, of drinking and of participating in sports. Not being active in church in combination with having social contacts in health care is related to higher chances of smoking, of drinking and of participating in sports. It seems as if active church-membership is the main component in these analyses of relationships between network indicators of norms and health behaviour. We decided to

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[5] Following Levin and Vanderpool (1987), we compared health practices of seven religious affiliations and their frequency of church-attendance. Differences between these groups (Dutch Reformed, Calvinistic, Roman Catholic, Jewish, Islamic, Humanist, and 'other') with respect to health practices were apparent. Muslims report healthiest practices, especially with regard to smoking and drinking. Dutch Reformed people report second best health practices. Because these different religious affiliations are also characterized by differing frequencies of religious attendance in our sample, the overall measure for frequency of attendance (regardless of type of religion) appears to be a stronger predictor of health practices than the separate religious affiliations. For instance, Calvinists report almost worst health practices (they occupy the fifth place in our ranking), but also a very low percentage of frequent attenders. And Roman Catholics report on average better health practices (they occupy the third place), and half of them visits church frequently. Consequently, we did not distinguish between the several religious affiliations, but rather concentrated on active (=frequent attendance) church-membership.

further analyze these groups apart from each other without interaction, because the combinations made revealed no new information.

Table 5.2. Results of logistic regression analyses to determine associations between smoking, drinking, participating in sports, or BMI, and network indicators of healthy norms, like A) active church-membership, B) social contacts in health care, and C) these two indicators combined, 1) not controlled, and 2) controlled for gender, age, and education (non-standardized coefficients, N=2,264-2,305)

	Dependent variables:							
	smoking		drinking		BMI		sports	
	1)	2)	1)	2)	1)	2)	1)	2)
A) gender		.54***		1.78***		.06		.08
age		-.01***		.01**		.01**		-.02***
education		-.20***		.13**		-.15***		.30***
active church-membership	-.58***	-.55***	-.44***	-.34*	.05	-.06	-.42***	-.23*
constant	-.25***	.98***	-1.44***	-1.78***	-.35***	-.25	-.27***	-.24
B) gender		.58***		1.82***		.06		.11
age		-.01***		.01**		.01**		-.02***
education		-.19***		.12*		-.14***		.30***
social contacts in health care	-.13	-.01	.07	.13	-.25**	-.10	.37***	.07
constant	-.37***	.91***	-1.59***	-1.84***	-.23***	-.24	-.57***	-.28
C) gender		.54***		1.79***		.05		.09
age		-.01***		.01**		.01**		-.02***
education		-.20***		.11*		-.14***		.29***
active church-membership	-.68***	-.68***	-.60**	-.52*	.02	-.08	-.44**	-.26
social contacts in health care	-.09	.07	.14	.22	-.24*	-.09	.38**	.09
not church, but social contacts in health care	.75***	.98***	1.03***	1.04***	-.19	.03	.85***	.39*
church, and no social contacts in health care	.16	.23	.29	.30	.05	.04	.03	.04
church, and social contacts in health care	-.84***	-.91***	-.89***	-.82***	-.03	-.12	-.47**	-.30
constant	0.21**	.96***	-1.50***	-1.83***	-.25***	-.23	-.44***	-.26

Coding: smoking (0=no, 1=yes), drinking (0=no, 1=yes), sports (0=no, 1=yes), BMI (0=not too much or little, 1=too much or little), gender (0=female, 1=male), age (in number of years), education (higher score is higher level of education), active church-membership (0=no, 1=yes), social contacts in health care (0=no, 1=yes), combination of active church-membership and social contacts in health care in dummies: not church and no social contacts as indicator, not church but social contacts (0=no, 1=yes), church-membership but no social contacts (0=no, 1=yes), church-membership and social contacts (0=no, 1=yes); Statistical significance: * = $p < .05$, ** = $p < .01$, *** = $p < .001$

We know now that density and homogeneity of the network have either no relationship or only a weak one with the occurrence of complaints, and that the type of social network matters when health practices are concerned. A next step in our analyses is to combine these characteristics to test the hypotheses on moderation and awareness with regard to health status. As stated, we expect that health-enhancing norms and a high density or homogeneity are related to fewer complaints. We will first describe the analyses for our hypothesis on moderation. We used the method of entering variables forced in steps again. The first analysis consists of entering the interaction variables of household composition, proportion of kin or frequent contacts by active church-membership while controlling for gender, age and education. For the second analysis for each type of complaints we also added the four health practices as control variables. We show the coefficients for all kinds of analyses in table 5.3 and 5.4.

Table 5.3. Results of logistic regression analyses to determine associations between combinations of active church-membership with household composition, and occurrence of complaints, 1) controlled for gender, age and education, or 2) controlled for gender, age, and education, and four health practices (non-standardized coefficients, N=2,124-2,283)

	Dependent variables: occurrence of					
	minor complaints		feeling in bad health		psychiatric complaints	
	1)	2)	1)	2)	1)	2)
gender	-.44***	-.44***	-.12	.04	-.77**	-.84**
age	-.01***	-.01***	.02*	.02	-.01	-.01
education	.08*	.09*	-.26*	-.23*	.04	.04
sports		-.01		-.01*		.01
BMI		.13*		-.15		.10
drinking		-.01		-.20		.09
smoking		.09		-.19		.23
composition of household:						
one-parent family	-.78	-.36	-3.89	-3.83	2.04	2.24
two-parent family	-.40	-.40	-.86	-.89	-.10	-.20
couple	-.17	-.14	-.03	-.02	-.35	-.35
active church-membership	.43	.44	-.51	-.33	-.16	-.14
composition of household by active church-membership:						
couple, non church-member	.42	.41	-.04	.18	.71	.67
one-parent family, non church-member	.39	-.03	4.60	4.72	-.77	-1.03
two-parent family, non church-member	.53	.55	.49	.72	.43	.51
alone, church-member	3.12*	2.27	9.32	10.03	-1.38	-1.68
couple, church-member	-.59*	-.55*	.01	-.20	-1.06	-1.02
one-parent family, church-member	-1.17	-.33	-8.49	-8.55	2.81*	3.27*
two-parent family, church-member	-.93***	-.95***	-1.35	-1.61*	-.53	-.71
Constant	.34	.19	-3.43***	-2.89***	-3.75***	-4.21***

Coding: minor complaints (0=no, 1=at least 1), feeling in bad health (0=feeling (very) healthy, 1=not feeling (very) healthy), psychiatric complaints (0=no possible case, 1=possible case), gender (0=female, 1=male), age (in number of years), education (higher score is higher level of education), sports (number of minutes), BMI (0=normal, 1=moderate overweight, 2=serious overweight or weight too low), smoking (0=no, 1=less than 20 per day, 2=20 or more per day), drinking (0=no, 1=minimal or mild, 2=moderate, 3=excessive), composition of household by active church-membership in dummies (0=no, 1=yes) whereby living alone and not being active in church is the reference group; Statistical significance: * = $p < .05$, ** = $p < .01$, *** = $p < .001$

Table 5.4. Results of logistic regression analyses to determine associations between combinations of active church-membership with A) proportion of kin, or B) proportion of frequent contacts, and occurrence of complaints, 1) controlled for gender, age and education, or 2) controlled for gender, age, and education, and four health practices (non-standardized coefficients, N=2,124-2,283)

	Dependent variables: occurrence of					
	minor complaints		feeling in bad health		psychiatric complaints	
	1)	2)	1)	2)	1)	2)
A) gender	-.44***	-.45***	-.31	-.08	-.75**	-.83**
age	-.01**	-.01**	.02**	.02	-.01	-.01
education	.07	.08*	-.28*	-.24	-.01	-.01
sports		.01		-.01*		.01
BMI		.13*		-.09		.10
drinking		.02		-.19		.07
smoking		.09		-.31		.24
proportion of kin	-.18	-.20	.44	.28	.15	.18
active church-membership	.09	.10	-.16	-.27	-.87	-.78
proportion of kin by active church-membership	-.14	-.12	-1.01	-.86	.48	.46
Constant	.54*	.38	-4.02***	-3.07***	-3.18***	-3.63***
B) gender	-.43***	-.44***	-.31	-.08	-.74**	-.82**
age	-.01**	-.01**	.02*	.02	-.01	-.01
education	.08*	.09*	-.30*	-.26*	-.04	-.04
sports		-.01		-.01*		.01
BMI		.13*		-.08		.10
drinking		.02		-.19		.06
smoking		.09		-.31		.24
proportion of frequent contacts	-.08	-.06	-.42	-.50	-.36	-.36
active church-membership	.17	.18	-1.92*	-2.00*	-.63	-.56
proportion of frequent contacts by active church-membership	-.20	-.18	1.77	1.82	-.02	.01
Constant	.55*	.35	-3.42***	-2.52**	-2.73***	-3.16***

Coding: minor complaints (0=no, 1=at least 1), feeling in bad health (0=feeling (very) healthy, 1=not feeling (very) healthy), psychiatric complaints (0=no possible case, 1=possible case), gender (0=female, 1=male), age (in number of years), education (higher score is higher level of education), sports (number of minutes), BMI (0=normal, 1=moderate overweight, 2=serious overweight or weight too low), smoking (0=no, 1=less than 20 per day, 2=20 or more per day), drinking (0=no, 1=minimal or mild, 2=moderate, 3=excessive), proportion of kin by active church-membership (proportion between 0 and 1, proportions of people who are not active in church are all set to 0), proportion of frequent contacts by active church-membership (proportion between 0 and 1, proportions of people who are not active in church are all set to 0); Statistical significance: * = $p < .05$, ** = $p < .01$, *** = $p < .001$

The main conclusion drawn from tables 5.3 and 5.4 is that adding health practices to the analyses does not change relationships much between occurrence of complaints and the social network. A few results are worth mentioning here, although these generally do not differ according to whether we took health practices into account or not. The negative coefficients for combinations of active church-membership and people living in two-parent families or as a couple indicate that these groups have lower chances of minor complaints. People living in a one-parent family who are active church-members appear to have higher chances of psychiatric complaints. Table 5.4 also shows that adding health practices to the analyses does not change relationships much between occurrence of complaints and the social network. The only statistical significant result to report from this table concerns church-membership: active church-members seem to have lower chances of feeling in bad health[6,7].

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[6] We performed these analyses (table 5.3 through 5.6) also for men and women separately. According to Umberson (1992), women are more likely to attempt to control the health of others than men, and for men marriage is associated with more efforts to control health than for women (p. 907). Therefore, we report the differences between men and women in effects of network characteristics on health status (not shown).
One general conclusion for these analyses must be that all relationships to be mentioned for men and women separately do not disappear when the four health practices are taken into account. The following differences between men and women are found. Living alone or in a one-parent family and being active in church provides higher chances on minor complaints for women only. We recall that for all respondents (table 5.3), being active in church in combination with household composition was not significantly related to occurrence of complaints, and nor is it for men. The finding that living in a one-parent family and not being active in church is related to feeling in bad health and psychiatric complaints is only apparent for men, not for women.
When looking at men and women separately, we do find some statistically significant relationships between occurrence of complaints and the combination of household composition and having social contacts with people working in health care. Women without these contacts, living alone or with a partner (but without children), appear to have higher chances on minor complaints, Also, women with these contacts and living with a partner (but without children) have higher chances on minor complaints. On the contrary, men living in a two-parent family without social contacts in health care have lower chances on minor complaints. For feeling in bad health, the relationship with the combination of living in a two-parent family and having no social contacts in health care is only apparent for women. Further, for men only, we find a statistical relationship between feeling in bad health and living in a one-parent family in combination with social contacts in health care. For women this relationship is opposite (but not significant) to the one for men: women with these contacts and living in a one-parent family appear to have lower chances on feeling in bad health. With regard to psychiatric complaints, we have no differences to report between men and women in this respect.
With regard to the proportions of kin and frequent contacts there appeared to be very few statistical significant results for all respondents (table 5.4 and 5.6). Occurrence of minor and psychiatric complaints was not related at all to any combination of norm indicators of the network and these proportions. By separating men and women in the analyses there appears to be one exception to this rule: men with social contacts in health care and a higher proportion of frequent contacts have higher chances of minor complaints than men without these contacts or a lower proportion of frequent contacts. Further, for feeling in bad health the relationship with the combination of having social contacts in health care and the proportion of frequent contacts is only apparent for men. Conducting separate analyses for men and women for the combinations of active church-membership and the proportion of kin or frequent contacts did not bring about any statistical significant results.

The second norm, awareness of good health practices, is the focus of the next analyses. Again we conducted logistic regression analyses in the same sequence as before, but now for interaction effects of density or homogeneity with having social contacts in health care. Results are shown in table 5.5 and 5.6.

From table 5.5 and 5.6 we must again conclude that adding health practices to the analyses does not change the relationships between occurrence of complaints and the social network dramatically. People living in one-parent families apparently have higher chances of psychiatric complaints and feeling in bad health, which shows more for those people with social contacts in health care among them than for those without these contacts. People living in two-parent families or as a couple appear to have higher chances on minor complaints. And people living alone with social contacts in health care have lower chances of minor complaints. All these results are apparent whether we take health practices into account or not. We will discuss the implications of our results in the next section.

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[7] We also performed separate analyses for minor complaints distinguished in eight groups. These groups are distinghuised with the help of the ICPC-categorization (Lamberts and Woods 1987): general and unspecified complaints, neurological complaints, respiratory and ear complaints, circulatory complaints, digestive complaints, urinary complaints, musculoskeletal complaints and female genital complaints. Prevalence figures range from 1 to 29 %.

We conducted logistic regression analyses for these groups like those for the total group of minor complaints. We report here the interesting relationships of combinations of network characteristics and norms with occurrence of complaints in every group, like in table 5.3 through 5.6. For respiratory-, digestive-, and urinary complaints, none of the combinations of norms and density or homogeneity of the social network shows statistical relationships. For other complaints, there are some, but very few relationships to mention. A general comment must be that findings for these eight groups of complaints only refer to one of the two genders, never to both. For instance, females who are not active in church and who live with a partner but have no children, have higher chances of general and unspecified complaints than females who are active in church and who live in a two-parent family (the indicator group). Males who live with a partner but have no children, for the group with social contacts with health professionals as well as for those without these contacts, have lower chances on these complaints. These relationships hold whether we take health practices into account or not.

Two relationships disappear after taking health practices into account, but for women only. These regard the proportions of kin and frequent contacts in combination with active church-membership. Being active in church and having a higher proportion of kin or frequent contacts are both related to less chances of general and unspecified complaints, but this relationship disappears when health practices are considered. There is also a relationship to report that becomes significant once health practices are taken into account: a higher proportion of kin in combination with social contacts with health professionals is related to higher chances of neurological complaints.

Other relationships which hold, whether we take our four health practices into account or not, are with regard to musculoskeletal and circulatory complaints. A combination of active church-membership with living with a partner but without children is related to lower chances on musculoskeletal complaints for women only. Beneficial for these same complaints (also only for women) is the combination of living with a partner but without children and having no social contacts with health professionals. With regard to circulatory complaints, men living as a couple (without children) and having no social contacts with health professionals appears to be beneficial. The last result to report here also regards circulatory complaints: men with social contacts with health professionals and a higher proportion of frequent contacts have higher chances on these kind of complaints.

Table 5.5. Results of logistic regression analyses to determine associations between combinations of having social contacts with people working in health care, with household composition, and occurrence of complaints, 1) controlled for gender, age and education, or 2) controlled for gender, age, and education, and four health practices (non-standardized coefficients, N=2,130-2,283)

	Dependent variables: occurrence of					
	minor complaints		feeling in bad health		psychiatric complaints	
	1)	2)	1)	2)	1)	2)
gender	-.44***	-.43***	-.13	.01	-.69**	-.77**
age	-.01***	-.01***	.02*	.01	-.01	-.01
education	.08*	.09*	-.19	-.15	-.01	.01
sports		-.01		-.01*		.01
BMI		.13*		-.15		.11
drinking		-.02		-.18		.09
smoking		.09		-.15		.26
composition of household:						
one-parent family	-.09	-.09	1.60	1.55	2.00*	1.97*
two-parent family	.21	.21	-.55	-.55	-.03	-.09
couple	.39	.39	.28	.28	.03	.01
social contacts in health care	-.33	-.28	-.99	-.79	.86	.81
composition of household by social contacts in health care:						
couple, no contacts	-.50	-.47	-.36	-.18	.42	.42
one-parent family, no contacts	-.73	-.64	-1.57	-1.26	-1.14	-1.15
two-parent family, no contacts	-.47	-.42	.13	.30	.58	.66
alone, and contacts	-2.54*	-2.32*	-4.12*	-3.21	-1.28	-1.15
couple, and contacts	.89***	.85**	.64	.46	-.49	-.41
one-parent family, and contacts	.64	.55	3.17*	2.81*	3.14*	3.12*
two-parent family, and contact	.68***	.63*	-.68	-.85	-.61	-.75
Constant	.63*	.47	-3.31***	-2.84***	-4.03***	-4.56***

Coding: minor complaints (0=no, 1=at least 1), feeling in bad health (0=feeling (very) healthy, 1=not feeling (very) healthy), psychiatric complaints (0=no possible case, 1=possible case), gender (0=female, 1=male), age (in number of years), education (higher score is higher level of education), sports (number of minutes), BMI (0=normal, 1=moderate overweight, 2=serious overweight or weight too low), smoking (0=no, 1=less than 20 per day, 2=20 or more per day), drinking (0=no, 1=minimal or mild, 2=moderate, 3=excessive), composition of household by having social contacts with people working in health care in dummies (0=no, 1=yes) whereby living in alone and not having these contacts is the reference group; Statistical significance: * = $p < .05$, ** = $p < .01$, *** = $p < .001$

Table 5.6. Results of logistic regression analyses to determine associations between combinations of having social contacts with people working in health care, with A) proportion of kin, or B) proportion of frequent contacts, and occurrence of complaints, 1) controlled for gender, age and education, or 2) controlled for gender, age, and education, and four health practices (non-standardized coefficients, N=2,130-2,283)

	Dependent variables: occurrence of minor complaints		feeling in bad health		psychiatric complaints	
	1)	2)	1)	2)	1)	2)
A) gender	-.43***	-.44***	-.29	-.08	-.65*	-.74*
age	-.01**	-.01**	.02*	.01	-.02	-.01
education	.06	.07	-.23	-.19	-.05	-.04
sports		.01		-.01*		.01
BMI		.13*		-.09		.10
drinking		.01		-.18		.06
smoking		.09		-.25		.31
proportion of kin	-.27	-.31	.08	-.04	.47	.43
social contacts in health care	.06	.03	-.68	-.67	.60	.50
proportion of kin by social contacts in health care	.14	.21	.20	.20	-.35	-.22
Constant	.57**	.42	-3.70***	-2.89***	-3.45***	-3.91***
B) gender	-.43***	-.44***	-.29	-.07	-.64*	-.73*
age	-.01**	-.01**	.02**	.01	-.02	-.01
education	.07	.08	-.24	-.19	-.08	-.07
sports		.01		-.01*		.01
BMI		.13*		-.09		.10
drinking		.01		-.18		.05
smoking		.09		-.25		.32
proportion of frequent contacts	-.31	-.28	-.08	-.15	-.05	-.01
social contacts in health care	-.19	-.16	-.64	-.66	.79	.80
proportion of frequent contacts by social contacts in health care	.44	.40	.07	.13	-.54	-.62
Constant	.70**	.50	-3.59***	-2.78***	-3.08***	-3.58***

Coding: minor complaints (0=no, 1=at least 1), feeling in bad health (0=feeling (very) healthy, 1=not feeling (very) healthy), psychiatric complaints (0=no possible case, 1=possible case), gender (0=female, 1=male), age (in number of years), education (higher score is higher level of education), sports (number of minutes), BMI (0=normal, 1=moderate overweight, 2=serious overweight or weight too low), smoking (0=no, 1=less than 20 per day, 2=20 or more per day), drinking (0=no, 1=minimal or mild, 2=moderate, 3=excessive), proportion of kin by having social contacts in health care (proportion between 0 and 1, proportions of people have do not have these social contacts are all set to 0), proportion of frequent contacts by having social contacts in health care (proportion between 0 and 1, proportions of people who do not have these social contacts are all set to 0); Statistical significance: * = p < .05, ** = p < .01, *** = p < .001

5.6. Conclusion and discussion

In this chapter we described relationships between characteristics of the social network and health for respondents not under stress. Through this selection we intended to describe pure "direct" effects of network characteristics on health. We argued that when effects of social networks on health are analyzed for people under some level of stress, "buffer" and "direct" effects cannot be disentangled. Further, we argue that it is the mechanisms that could be responsible for each effect that is important. For "direct" effects we hypothesized the mechanism of social regulation to be responsible. In terms of the theory of social capital, we hypothesize that people in more dense or homogeneous social networks will feel a stronger obligation or have a greater interest in complying with the norms within that network. With regard to health this means that people in more homogeneous networks will tune in their health practices to the norms in their social network.

We consider two types of norms important for better health: moderation and awareness. Moderation is supposed to be more prevalent among the religious in the Netherlands. And awareness of good health practices will be more prevalent among the people who are close to the profession of medicine. Thus the resulting hypotheses are: when people are religious and live in a more homogeneous social network, they will be healthier because they comply to norms living moderate. And: when people are close to the profession of medicine and live in a more homogeneous social network, they will be healthier because they comply to norms of living healthy.

To test these hypotheses we used data from health interviews among a representative sample of the Dutch. We selected for people who were not under stress, because only this allowed us to disentangle "direct" and "buffer" effects. There are very few significant relationships between indicators of the social network and health to report. But from all results we find, one thing is clear: relationships hold whether we take health practices into account or not. We assumed people living in networks characterized by moderation or awareness to be in better health, provided that their networks strongly encouraged these norms. Moderation, indicated by active church-membership, appeared to be related to less smoking and drinking. And awareness, as indicated by having social contacts with health professionals, is related both to being in the right weight and participating in sports (although these relationships became statistically non-significant after taking the effect of gender, age and education into account). The next step in our research was to investigate the combined effect of supposed norms of the network with the density or homogeneity of the network, on the reported health status. These combined effects appeared to be related to health status whether we took health practices into account or not. So, we must conclude that, with our material, the effect of social regulation on health status cannot be demonstrated. In short, we do find a few "direct" relationships between social networks and health, but it does not work as we assumed.

As is the case in all studies, ours has its weaknesses. Our study is of a cross-sectional nature. Because we analyze relationships between occurrence of complaints, health practices and characteristics of the personal network all at the same time, causality could be a problem. Another limitation of our data-set is that our measures are all self-reported. We consider more objective measures to be more reliable especially with regard to health status and health practices. Because we used self-reported measures of health, the question rises as to whether health practices will have any effect on these self-reports. This question is central to the study of Kooiker (1993). With regard to our study, we must conclude that the effects of self-reported health practices on self-reported health are minimal. The indicators of norms in the social network also require discussion. Active church-membership as indicator of moderation, and having social contacts with health professionals as indicator of awareness, are only proxies and they do not directly measure these norms of the network-members. Future studies should take the norms of network-members into account explicitly. Further, the proportion of kin in the network was used as an indicator of homogeneity, assuming that a more homogeneous network would affect attitudes and behaviour. Other studies showed that homogeneity with regard to a structural position also has effects on attitudes and behaviour (Erickson 1988, Bienenstock, Bonacich and Oliver 1990, Kilburn 1993). These characteristics of the network-members (educational level, income, socio-economic status, ethnicity, religion) were not available to us. With regard to the indicator of density, the proportion of frequent contacts, we have less doubts in this respect. Frequent contacts are supposed to be characterized by comparison leading to adjusting attitudes to each other (Erickson 1988). If the comparison leads to conflicts, contacts will break up or become less frequent. But it must be clear that a higher proportion of frequent contacts does not lead to a higher density per se. Density is usually defined as the number of relations between network-members divided by the maximum number of possible relations between network-members. It seems obvious that in social networks characterized by a higher proportion of frequent contacts, and also by a higher proportion of kin, the chance that network-members have relations with eachother apart from the person in focus is relatively high. But these proportions do not measure density directly. In evaluating our findings and comparing them with others, we must take these limitations into consideration.

Research by Umberson (1987) indicates that social network characteristics like marriage and parenthood are associated with better health practices through social regulation. The expected next step, towards the association with health, has not been reported in the literature yet. Langlie (1977) reported that people in "parochial" social networks (indicated by ethnic exclusivity, friendship solidarity, and traditional family relations) have worse health practices (p. 252), but the effect of social regulation is not involved in Langlie's study. This study was also limited to health practices, so again we cannot compare our results fully with those of others.

Quite a number of studies, especially longitudinal prospective community studies, report effects of social network characteristics on mortality, controlled for gender, age, socio-economic status and base-line health status (e.g., Berkman and Syme 1979, Blazer 1982, House, Robbins and Metzner 1982, Reed et al. 1983, Schoenbach et al. 1986, Orth-Gomér and Johnson 1987, Hanson et al. 1989, Olsen et al. 1991). Berkman and Breslow (1983) reported effects of an index of social network characteristics on mortality as well as morbidity. They found that social networks and health practices each were independently associated with health. A disadvantage of these studies is that people under stress are included in their research populations. Buffer and direct effects as we disentangle them, can therefore not be separated in the above studies.

Gottlieb and Green (1984) studied whether social networks have an influence on health in addition to effects through health practices, for a selection of healthy persons in a representative sample. People under stress were not excluded. Gottlieb and Green first showed that marriage, many contacts with family and friends, church-membership and membership of voluntary organizations have a relationship with health behaviours, like exercise, smoking (over)weight, alcohol consumption and sleeping patterns. For instance, female church-members appeared to be overweight more often than female non-members. Then they investigated the relationship between network characteristics and health whereby health practices (and also life events), were taken into account. They do not analyze the relationships between social networks and health without controlling for health practices. Therefore, they cannot state anything about changing effects of social networks on health when health behaviours are taken into account: they simply do not show the effects before taking health practices into account.

To our knowledge, there are no studies that report on relationships between social networks and health while controlling for health practices as we have done. And we also could not find any other reports on populations not under stress. Thus, although our study has its limitations, we feel reporting our results will be of significance for others. We conclude by saying that although social regulation seems to take place at the level of health practices, the effect of this social regulation on health status could not be demonstrated. But it is also possible that another mechanism is at work. This other possible direct path from network characteristics to health is suggested by some authors (Berkman 1985, House, Landis and Umberson 1988) but has not been much under empirical study yet. This path consists of direct physiological changes (like elevated bloodpressure) instigated by members of the social network, that influence the disease susceptibility. There is some evidence of animal laboratory and clinical experiments that less exposure to social contacts produce a worse physiological or psychological status that could produce occurrence of health complaints (Lynch 1979, reviews: Berkman 1985, House, Landis and Umberson 1988). It is, of course, not possible to describe the physiological changes in terms of a social theory, i.e., the theory of social capital. This line of research seems to have potential for collaboration between workers in the field of social networks and in the field of medicine.

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6. Social support and stressful events in two dimensions: life events and illness as an event

6.1. Introduction

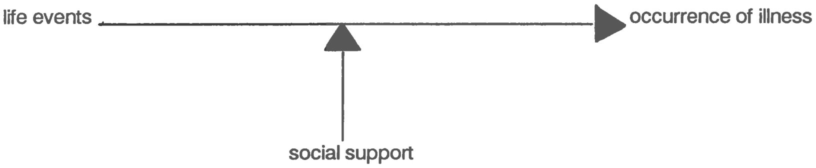
Support is implicated in the aetiology of and recovery from both physical and mental illness (see for reviews: Leavy 1983, Wallston et al. 1983, Wortman and Conway 1985, Ganster and Victor 1988, Cohen 1988, 1989, Schwarzer and Leppin 1991). Two distinct ideas to explain the relationship between support and health have been put forward. First, the direct effect hypothesis argues that support enhances health and well-being irrespective of level of stress. Secondly, according to the buffering hypothesis, support exerts its effects in the presence of stress, by protecting people from the negative consequences of stress. Direct or buffering processes are established in empirical research when different concepts and types of measurement of social support are used. Direct effects tend to be found when support is measured by the degree to which a person is integrated within a social network, while buffering effects tend to be shown when support is indicated by the availability of resources that help one respond to stressful events (Cohen and Syme 1985, Cohen and Wills 1985, Israel and Rounds 1987, Van Sonderen 1991). In this chapter we want to contribute to the study of social support as a buffer of the stress of events.

At present, there is an extensive literature on life events and their effects on mental health, and also some literature on the effects on physical health, although the results with regard to the latter are not straightforward (Tausig 1986, House, Umberson and Landis 1988). The foregoing argument can also be applied to illness itself. Becoming or being ill is also an event that requires adaptation: the length of the illness or the extent of complaints can be mediated by support. The extent to which people succeed in adapting to this type of stress can be learned from the duration of their illness and the degree of disabilities.

The central questions we will try to answer here are: *1) When we consider stressful life events, does social support buffer their effects on becoming ill?; 2) When we consider illness as stressor, does social support buffer the level of disabilities and duration of that illness?* We expect that, in the case of life events, illness will occur less often when support is provided. In case of illness as the stressor, we expect that the illness will be of shorter duration or will be accompanied by fewer limitations in respect of daily activities when support is provided.

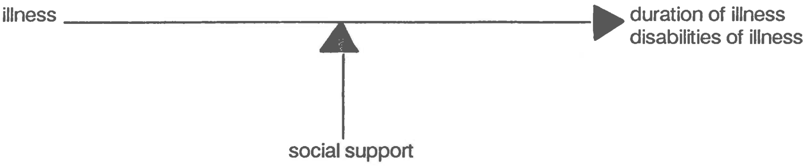
We summarize our argument in the following figures. For life events we assume, as is usually done, that social support buffers their effects on the occurrence of illness. This is shown in figure 6.1.

Figure 6.1. Buffer effects of social support for life events



While talking illness as stressor, we argue that when relatively more support is provided, the person who is ill will recover sooner or will experience fewer disabilities. This is shown in figure 6.2.

Figure 6.2. Buffer effects of social support for illness as stressor



In investigating these hypotheses we take a somewhat different angle than what seems standard in the literature. We argue that buffering effects can only take place when events to be buffered are present. Therefore, we do not analyze the often used interaction of events and support, but instead select respondents who have met specific events. Finding a buffer effect through interaction actually means that people experiencing more events ànd more support suffer fewer consequences than people experiencing fewer or no events at all òr less support or none at all. But we are not interested in the case of fewer or no events for our analyses here, because then there is nothing to buffer. We believe the central issue of the buffer effect is: does support act as a buffer in case of events?

A shortcoming in existing research thus far has been the lack of theoretically developed hypotheses. Why is it that support influences illness? Possible answers to this question are sometimes suggested in a rather ad hoc manner (Berkman 1985, Cohen 1988). In this chapter we want to make a contribution to the debate on buffering effects by providing some theoretical notions that might explain why some researchers find buffer effects and others do not. These notions are presented in the next section.

6.2. A theory of buffer effects

Social support is seen as a function of personal relations (House, Umberson and Landis 1988). Different sides to social support like types of social support, experienced or "objective" support, positively or negatively experienced support are popular topics in the research literature. Today, the idea of social support has been thoroughly examined, but no one version of this concept has been generally accepted. Here, we propose the theory of social capital, which, we believe, makes a contribution to the empirical and theoretical discussion as it has developed.

The theory of social capital assumes that people have access to resources of the people they know (Bourdieu 1980, Flap 1988, Coleman 1988). These resources are called social or "second order" resources, meaning that network-members control the social resources ego has access to (Boxman 1992). In order to achieve certain goals (like health) people can use their personal (e.g., economic, cultural, physical) and their social resources. People with more resources, including social resources, are better able to achieve their goals (Campbell, Marsden and Hurlbert 1986). People obtain social capital by investing in their social network by way of entering in new relations, or expanding and preserving old relations (Flap 1988). The assumption made is that people invest in social relations to guarantee access in the future, or to repay investments made by others in the past. Therefore, social capital is more than a simple count of all people in the network and their personal resources. Social capital is the result of a) the number of people willing to provide support, b) the resources that can be mobilized in this indirect manner, and c) the extent in which these people are willing or committed to providing support.

From these assumptions it follows that access to social resources does not imply use. The network-members who control the resources may already have made great investments in ego in the past: ego does not want to become more indebted (Joosten, Van der Horst and De Witte 1986), or these network-members may no longer feel indebted to ego because they see no future repayment from ego (Rounds and Israel 1985). Further, social resources may be goal-specific: "It takes a strong man to carry an invalid" (Litwak 1985). This may be an explanation for the fact that measures of integration do not, and measures of available resources in times of stress do buffer according to the literature.

In terms of the theory of social capital, the buffer effect concerns those cases in which support is actually mobilized. According to our theory, people may use the social resources they have built up in the past for achieving momentary goals. If their well-being is threatened by stressful events (and we see the occurrence of illness also as a stressor), they can reduce the consequences by resorting to their social resources. When people have more social resources and when they are able to mobilize more of these resources, the consequences of stressful events will be less severe or of shorter duration. This buffer effect will not occur or will do so to a lesser degree if the persons to whose resources one has access to are less socially indebted. Because social resources are often goal-specific it is also possible that the support available is of no use in the specific situation arising. One might suppose that the buffer effect would also be influenced by the availability of professional health care: i.e., when professionals are available, no support from lay network-members is necessary. Since professional providers of support are more or less equally available to all in the Dutch society, we do not imagine that the buffer effect will be influenced to any degree by the presence of professional health care. Empirical support for this assumption can be found in Litwak (1985), Van den Brink-Muinen and Sixma (1990) and Janssen (1992). Moreover, for problems of everyday life there are no standard solutions, which usually are offered by professionals. Social resources are particularly adequate in case of such unpredictable events, in tasks with many contingencies which can not be easily subdivided (Litwak 1985, p. 10).

Like Litwak (1985), Cohen and McKay (1984), and Cutrona and Russell (1990), who categorized sources and types of social support according to the specific needs of individuals, we assume that specific types of social support are more relevant to the consequences of some events than of others. The characteristics of the specific events and of the types of social support have to match (Cohen 1988, Cutrona and Russell 1990). A general distinction in types of support can be found in the work of House and Kahn (1985) and Schonfeld (1991). The most frequently used categories are emotional support, practical support, informational support and social companionship. We hypothesize that emotional support is more relevant when an event causes anxiety. An event will cause more anxiety if people do not know much about it, if the event does not occur frequently, or if a specific event can not be related directly to a specific cause. There is a need for practical support when the event restricts everyday activities. And information is supposed to benefit people who face events that do require professional help, and when the causes of the events are relatively unknown. Social companionship might influence health or illness directly, but will not be useful in case of buffering the stressors because specific types of support and specific events have to match. We consider social companionship non-specific, and not meant to exchange any particular kind of support (compare the notion of instrumental versus expressive dimensions of social support, by Lin 1986). Regarding illness as an event, similar hypotheses are proposed, but now with regard to health-related support. We assume that, because events and support have to match, support related to illness is more able to buffer illness as an event than general types of support. Vice versa, general types of support are more able to buffer general types of stress (i.e., other life events than illness) than support related to health.

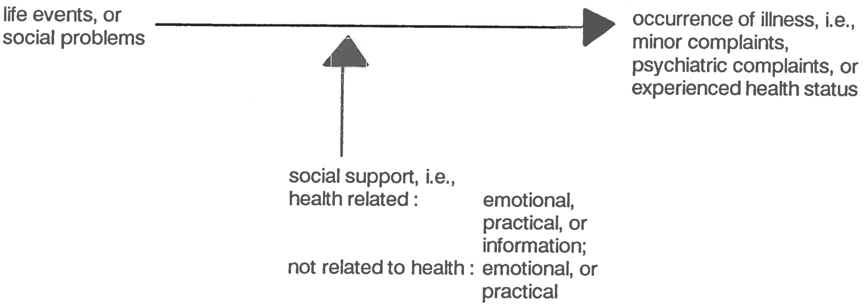
These theoretical notions provide us with a tool to examine the relationships among stressful events, support and illness. The goal-specific nature of social resources, like support, may explain why social support has a buffering effect in some studies and not in others. We hypothesize that, for a buffering effect to take place, the characteristics of specific events and of the mobilized types of social support have to match. To test this hypothesis, we conducted multiple regression analyses on several combinations of types of events and support. The next section gives more details about our data and methods.

6.3. Data and methods

6.3.1. Data

Data is gathered as part of the national survey "Morbidity and Interventions in General Practice" (Foets, Van der Velden and De Bakker 1992) by means of a health interview[1]. The total sample includes 17,047 respondents, the response rate is 77 %. Respondents of all ages are selected, but we have only presented findings for respondents aged 18 and over (N = 10,110) here, because this group can be considered to have more freedom in choosing their network-members than younger people. We will first describe the variables used in analyses on life events (figure 6.3), and then provide information on details of variables used in the analyses of illness as the stressor (figure 6.4).

Figure 6.3. Buffer effects of social support for life events: measurements



Life events in our study were measured with the help of two separate lists: life events experienced in the year before the interview (Ormel and Koeter 1985) and social problems experienced at the moment of the interview (Furer and Tax 1987). For each list, a sum-score of the number of events or problems was constructed. We decided to use the number of events or problems instead of specific single events on the basis of a literature study by Cohen and Wills (1985) in which they conclude that any single event is less likely to be health-threatening. "It is when multiple problems accumulate [...] that the

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[1] Over 17,000 respondents were selected from the records of 161 general practitioners. Since virtually the entire population of the Netherlands is registered with a general practitioner and since the sample is quite similar to the Dutch population (Foets and Van der Velden 1990), we may consider our sample representative.

potential for serious disorders occurs" (p. 312). About 50 % of all respondents reported two or more life events, and 33 % reported 2 or more social problems. The items on illness in the list of events were not included here, to avoid contamination with the measurement of the dependent variable, occurrence of illness. Life events in our list range from death of a spouse to starting a new career. Social problems range from problems in the relation with a partner to problems with housing. To indicate the occurrence of illness we used three indicators: minor complaints, psychiatric complaints and experienced state of health. Minor complaints experienced during the last two weeks prior to the interview were measured by a checklist developed by Foets and Van der Velden (1990). Occurrence of illness is computed by summing all reported complaints and coding this in 0=no complaints, 1=1 or more complaints, per respondent. Nearly 80 % of the respondents report 1 or more complaints[2]. The measure for psychiatric complaints used here is the General Health Questionnaire (GHQ-30, Goldberg 1972). The GHQ usually is used as a first stage screening instrument of non-psychotic psychiatric illness. Anyone reporting five or more positive items is a possible psychiatric "case" (Goldberg 1972, Tarnopolsky et al. 1979). In our study 13 % of all respondents reported five or more positive items. The GHQ must be viewed as measuring present mental health in relation to a "normal" status. The state of health experienced is measured on a five-point scale (1=very good through 5=very bad, recoded to 0 (scores 1 and 2) and 1 (scores 3, 4 and 5)). 17 % of all respondents experience their current health status as not good.

The central variables of this study are indicators of social support. To assess the amount and kinds of social support we used the exchange method (Fischer 1982). Six name-generating questions had to be answered, each referring to the provision of a specific type of social support[3]. Respondents were requested to list a maximum of three network-members per question, in reference to people outside the household. Several

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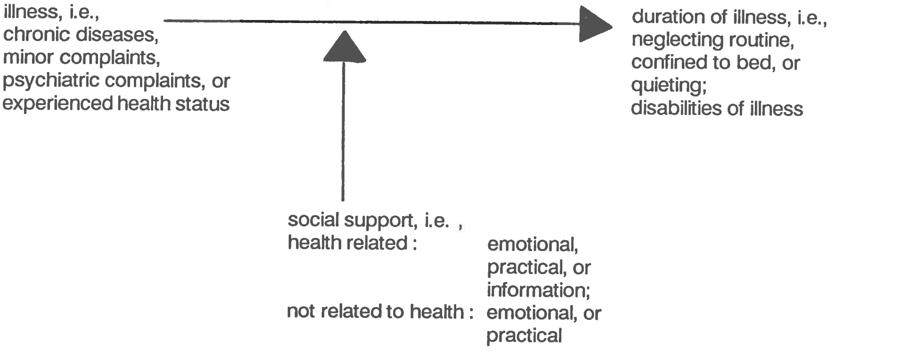
[2] Of the 42 complaints in the list, 2 were excluded for this study because they are not direct indicators of (physical or mental) health: problems at work, and family problems. The list contains the following other complaints: fever, general tiredness, general weakness, sweating problems, headache, vertigo/dizziness, throat complaints, ear pain/earache, buzzing, hearing complaints, sneezing/nasal congestion, nose bleed/epistaxis, cough, pressure/tightness attributed to the heart, palpitations/aware of heartbeat, pain attributed to the heart, nausea, vomiting, diarrhoea, heartburn, stomachache or pain, cramps, constipation, teeth/gum complaints, painful urination, incontinence, neck or shoulder complaints, hip complaints, back complaints, arm-, hand- or finger complaints, leg-, thigh, foot- or toe complaints, menstrual pain.
These complaints were distinguished in eight groups with the help of the ICPC (Lamberts and Woods 1987): general and unspecified complaints, neurological complaints, respiratory and ear complaints, circulatory complaints, digestive complaints, urinary complaints, musculoskeletal complaints and female genital complaints. Prevalence figures range from 1 to 29 %.

[3] Name-generating items were: "A. Do you talk with people when you have problems with your health? B. When you have a personal problem, do you talk about this with other people? C. Did you receive any help or assistance from people, with regard to a disease in the last few months? D. Did anyone help you with jobs around the house in the last three months? E. When you are away for a longer period of time, do you ask someone to watch the house, water the plants etc.? F. Did you visit anyone last month, or did anyone visit you, or have you been going out with people?"
For each item the next question was: "Can you tell me the names of at maximum three persons?"

types of social support can be distinguished: health-related support (see note 3: items A and C) and support not related to health (items B, D, E and F), and within these categories emotional support (items A or B) and practical support (items C or D and E). Item F is supposed to indicate social companionship, but as mentioned earlier, we have excluded this concept for the present problem at hand. We computed sum-scores for each respondent by counting the number of times the respondent reported receiving a specific type of support. Figures for support-variables can be found in chapter 2.

A last indicator of support is the amount of medical information people have access to through network-members working (or educated to work) in health care. Nearly half of the respondents had such network-members available to them. We acknowledge the fact that the existence of these social relations in the network does not mean that information is received by the respondent. Although we stated in the section on theory that availability of resources does not imply use of them, and that only use of resources might buffer, we can not analyze this to the full extent, because we have no direct data available on receipt of information.

Figure 6.4. Buffer effects of social support for illness as stressor: measurements



For the analyses on illness as stressor, we measured illness in terms of four indicators of which we already mentioned three (minor- and psychiatric complaints, and experienced health status) above. The fourth indicator concerns chronic diseases (see figure 6.4). The presence of a chronic disease was measured by a checklist developed by Van den Bos (1989). For each of 25 diseases[4], the respondent filled in whether he or she had this

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[4] These 25 chronic diseases are (in order of appearance on the check-list): chronic bronchitis/emphysema, asthma, hay fever, hypertension, heart complaints, cardiac failure, haemorrhoids, varices, ulcus cruris, arterio-sclerosis, backache (slipped disc, sciatica), rheumatism/arthritis/arthrosis, neoplasm/cancer, diseases of the nervous system (Parkinson's disease, multiple sclerosis, epilepsy), migraine/chronic headache, chronic gastro-intestinal disorders, diabetes, gallbladder and liver diseases, kidney diseases, thyroid gland diseases, prostatism/prostatis, menstruation/menopause complaints, chronic skin diseases/eczema, serious consequences of an accident, hereditary handicaps. Respondents with asthma and chronic bronchitis are included together. Respondents suffering from heart complaints or cardiac failure are also included

disease. 55.1 % of all respondents report one or more chronic diseases. We did not relate life events to the prevalence of chronic diseases, because these diseases generally precede the events and therefore such analyses would be causally incorrect. Several measures were used to indicate the duration of illness. The first is the number of days (in the last two months before the interview) respondents were not able to carry out their daily routine. This variable is labelled "neglecting". The second variable is the number of days (in the last two weeks) respondents reported having been "confined to bed". The last variable of this kind is the number of days (in the last two weeks before the interview) respondents have been slowing down: "quieting". In contrast to the actual duration of an illness these measures can be considered as "social" duration, or "social" limitations, because they indicate the consequences illness has for social life. The majority of the respondents (over 80 %) reported that they did not neglect their daily routine, had been confined to bed or were "quieting" (table 6.1). An adjusted version of a checklist developed by the OECD[5] (OECD-16, Van Sonsbeek 1988) was used to indicate the physical disabilities people meet with. Respondents could report to what extent they were able to perform certain activities themselves. Over 40 % of the respondents experienced one or more disabilities. These may range from not being able to climb the stairs, or not being able to run a 100 meters, to not being able to get dressed or cut food. We did not relate minor and psychiatric complaints to the disabilities people experience. These complaints are acute in contrast to the disabilities which may be lifelong. Such analyses would then be causally incorrect. Finally, the support variables employed in the analyses on illness as stressor are the same as the ones we have described above.

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together, because these diseases belong to the same groups in terms of symptoms. The original list consisted also of an 'other' category. This category was excluded because of suspected minor reliability.

[5] OECD stands for Organization for Economic Cooperation and Development.

Table 6.1. The number of days respondents could not carry out their daily routine in the last two months (neglecting), the number of days respondents were confined to bed during the last two weeks (confined to bed), the number of days respondents have been slowing down in the last two weeks (quieting) and the number of disabilities, in percentages (N = 10,110)

	Number of days neglecting	confined to bed	quieting	Number of disabilities
none	82.8	96.2	85.4	58.6
1 through 6	9.5	3.4	8.4	38.4
7 or more	7.7	0.4	6.2	3.0
missing values	89	11	56	1004
mean	2.82	0.13	1.10	1.07
(standard deviation)	(10.30)	(0.92)	(3.31)	(1.94)

6.3.2. Methods

Like Litwak (1985, and with regard to mental illness: Cohen and McKay 1984) we assume that specific types of social support are more relevant to the consequences of some events than of others. The characteristics of the specific events and of the types of social support have to match. Therefore, we categorized our measures of stress (life events, social problems) according to the supposed buffer effects of the types of support. We categorized these measures of stress ourselves. This may be not the best method. Accordingly we discuss this categorization below.

As indicated in table 6.2, we expect that the life events or social problems in our list require support not related to health. Correlations (Pearson product-moment, see Hays 1981), shown in table 6.4, between events requiring specific kinds of support (not related to health) and perceiving this kind of support are low but indicate that our categorization could be useful. These correlations are calculated for each number of events or problems in combination with the receipt of one particular type of support. All correlations indicate that the experience of more life events or social problems is related to the experience of more support. Relationships of life events and social problems requiring emotional support with receiving emotional support are statistically significant. The relationships of life events or social problems requiring practical support and receiving practical support are not statistically significant. Because the lists of events or problems requiring emotional or practical support partially overlap, the finding that correlations with the receipt of both types of support are statistically significant does not surprise us, although we would have expected stronger correlations with the matching type of support. Further, we see that these stressors are also related to the receipt of health-related types of support. We assume that, although the list of events and problems did not incorparate items on health problems, these correlations are due to the fact that people very often also experience health problems.

Table 6.2. Expected need for support per life event or social problem

	Support, not related to health		Health-related support		
	practical	emotional	practical	emotional	information
Life events:					
you moved, within town	+	0	0	0	0
you moved, out of town	+	+	0	0	0
you moved out parents house	+	+	0	0	0
your child moved out	0	+	0	0	0
your wife is pregnant, gave birth to a child[1]	+	+	0	0	0
your wife had an abortion or miscarriage[1]	0	+	0	0	0
you stopped working	0	+	0	0	0
other in family stopped working	0	+	0	0	0
you started working	+	0	0	0	0
other in family started working	+	0	0	0	0
you started school, college, etc.	+	0	0	0	0
you quitted school, college, etc.	0	+	0	0	0
you got a degree	0	+	0	0	0
you/other in family failed to get a degree	0	+	0	0	0
other in family married	0	+	0	0	0
other in family divorced	0	+	0	0	0
you/other in family run away	+	+	0	0	0
you had a financial success	+	0	0	0	0
you had a financial disappointment	+	+	0	0	0
you suffered loss due to theft, fire, violence	+	+	0	0	0
your partner died	+	+	0	0	0
your child died	+	+	0	0	0
your father/mother died	+	+	0	0	0
an important other died	0	+	0	0	0
you married	+	+	0	0	0
you divorced	+	+	0	0	0
you/partner had or has an affair	0	+	0	0	0
you were promoted	0	+	0	0	0
your pet died	0	+	0	0	0
you/other in family was involved in a lawsuit	+	+	0	0	0
Social problems:					
financial	+	+	0	0	0
housing	+	+	0	0	0
parents	0	+	0	0	0
education	+	+	0	0	0
work	+	+	0	0	0
getting older	0	+	0	0	0
partner	0	+	0	0	0
children	0	+	0	0	0
important others	0	+	0	0	0
contacts in general	0	+	0	0	0
sexual	0	+	0	0	0
religion	0	+	0	0	0
self-realization	0	+	0	0	0
yourself	0	+	0	0	0
future	0	+	0	0	0
addiction	0	+	0	0	0
loneliness	0	+	0	0	0
changes in society	0	+	0	0	0
neighbourhood	+	+	0	0	0
spending leisure time	+	+	0	0	0
life in general	0	+	0	0	0

[1] = for men only

We also categorized our measures of illness as event (chronic diseases, minor-, psychiatric complaints, and experienced health status) according to the supposed buffer effects of the different types of support. Table 6.3 shows our expectations regarding the needs for support of people experiencing those illnesses. We expect that these types of illness generally only require support that is related to health. We further expect that all chronic diseases require information, because, since these diseases are chronical, professional help might ease the consequences for daily life. Correlations between types of illness and all types of health-related support are shown in table 6.4. Experiencing more chronic diseases, more minor complaints, psychiatric complaints and feeling in bad health is generally related to receiving health-related emotional and practical support. For the availability of sources of information, the correlations with measurements of illness as stressor are mostly negative. Experiencing chronic diseases is generally related to perceiving less sources of information. Experiencing minor and psychiatric complaints, or feeling in bad health is not significantly related to receiving sources of information.

Correlations between one type of support and categories of, for instance, chronic diseases are always quite the same. This is due, of course, to the fact that the chronic diseases in each category overlap: one chronic disease often requires several kinds of support. The same is true for the categories of minor complaints.

Half of the correlations between types of support not related to health (emotional support in particular) and types of illness as stressor are also statistically significant. Suffering from a particular illness, of course, does not mean that only health-related matters are experienced. People who suffer from illness, probably also experience certain other life events or social problems. In further analyses, buffer effects of all kinds of support are estimated with regard to all kinds of stressors.

Table 6.3. Expected need for support per chronic disease, group of minor complaints, or psychiatric complaints

	Support, not related to health		Health-related support		
	practical	emotional	practical	emotional	information
Chronic diseases:					
arterio-sclerosis	0	0	+	+	+
backache (slipped disc, sciatica)	0	0	+	+	+
chronic bronchitis/emphysema, or asthma	0	0	+	+	+
chronic gastro-intestinal disorders	0	0	+	+	+
chronic skin diseases/eczema	0	0	0	+	+
diabetes	0	0	0	+	+
diseases of the nervous system (Parkinson disease, multiple sclerosis, epilepsy)	0	0	+	+	+
gall-bladder and liver diseases (incl. bilestones)	0	0	+	+	+
haemorrhoids	0	0	0	0	+
hay fever	0	0	0	0	+
heart complaints, or cardiac failure	0	0	+	+	+
hereditary handicaps	0	0	+	+	+
hypertension	0	0	0	+	+
kidney diseases (incl. kidney stones)	0	0	+	+	+
menstruation/menopause complaints[1]	0	0	+	+	+
migraine/chronic headache	0	0	+	+	+
neoplasm/cancer (incl. leukaemia)	0	0	+	+	+
prostatism/prostatitis[2]	0	0	+	+	+
rheumatism/arthritis/arthrosis	0	0	+	+	+
serious consequences of accident	0	0	+	+	+
thyroid gland diseases	0	0	+	+	+
ulcus cruris	0	0	+	+	+
varices	0	0	+	+	+
Minor complaints:					
general and unspecified	0	0	+	+	+
neurological	0	0	+	+	+
respiratory	0	0	0	0	0
digestive	0	0	+	+	0
circulatory	0	0	+	+	+
musculoskeletal	0	0	+	0	+
urinary	0	0	0	0	+
female genital[1]	0	0	+	+	+
Psychiatric complaints	0	0	+	+	+
Feeling in bad health	0	0	+	+	+

[1] for women only; [2] for men only

Table 6.4. Correlations between receipt of support and expected need for support

	Support, not related to health		Health-related support			N
	practical	emotional	practical	emotional	information	
Number of:						
social problems requiring emotional support	.01	.08*	.07**	.16***	.04**	3,257
social problems requiring practical support	-.02	.01	-.01	.09**	.02*	661
life events requiring emotional support	.03	.06**	.02	.07**	.08**	2,283
life events requiring practical support	.03	.05*	.01	.10**	.08**	1,748
chronic diseases requiring emotional support	-.02	-.05**	.13***	.01	-.07**	5,099
chronic diseases requiring practical support	-.01	-.04*	.13***	.02	-.05**	4,412
chronic diseases requiring information	-.01	-.05**	.12***	.03*	-.06**	5,570
minor complaints requiring emotional support	.01	.06***	.13***	.13***	.01	6,335
minor complaints requiring practical support	.02	.06**	.14***	.14***	.01	7,220
minor complaints requiring information	.03*	.05**	.15***	.13***	-.01	6,948
psychiatric complaints	-.02	.02	.08**	-.01	-.04	1,240
experienced health status (1=very good, 5=very bad)	-.01	-.05*	.09**	-.01	-.05	1,720

Statistical significance: * = $p < .05$, ** = $p < .01$, *** = $p < .001$

We state clearly that, as we are only considering buffer effects here, and since events or illness are the stressors that are hypothesized to be buffered by social support, we only selected respondents who reported events or illness. We used linear and logistic regression analyses, depending on the type of dependent variable. We only conducted logistic regression analyses for life events, since the dependent variable (occurrence of illness) is dichotomous (Hosmer and Lemeshow 1989). For illness as stressor, linear regression analyses were performed. The dependent variable for this type of analysis is continuous: the number of disabilities, or the number of days respondents neglected daily routine, or have been confined to bed, or have been quieting[6]. All coefficients are tested for significance at a one-tail $p < .05$ level.

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[6] Because a majority of the respondents did not report disabilities or neglecting their daily tasks etc., these dependent variables had to be transformed to be able to apply linear regression analyses. Best fitting results with regard to residuals and outliers (Weisberg 1985) were obtained by transforming the dependent variable with a square root: $\sqrt{y} + \sqrt{(y+1)}$, where y = dependent variable. Another option for to dealing with this problem is to recode the dependent variable in a dichotomous way. Then the question is not whether social support influences the number of disabilities, days neglecting routine etc., but whether social support influences the occurrence of disabilities or neglecting routine etc. Neglecting routine, being confined to bed and "quieting" must then also be considered as a kind of disability. Such a dichotomized dependent variable demands for logistic regression analyses.
The reader might wonder why we dichotomized our dependent variables in the analyses for life events and social problems, since these variables (number of minor complaints, psychiatric complaints, and feeling in bad health) have also skewed distributions. The reason for computing dichotomies here lies in our central questions. For analyses regarding life events and social problems we are mainly interested in *occurrence* of illness: does illness not occur when life events or social problems are buffered by social support? For the analyses on illness as event we are interested in buffer effects of support on *level* of disabilities and "social" duration. Anyway, whether we performed linear or logistic regression analyses, results were always quite the same.

Because types of support seem to overlap, we admitted only one type of support in each equation. When practical support is provided, for instance, people most often also experience emotional support. In order to distinguish these different types of support, we elicited them separately and also employed them in separate analyses.

In an attempt to take possible confounders into account, age, gender, education and the number of events or complaints were included in the analyses as control-variables. The number of events or complaints was included to indicate severity. We included the number of events or complaints only for the same category of events or complaints. All variables in regression analyses were used as continuous variables, except gender. Gender is a dummy-variable: 1 = male. Education is coded as 1=low, 5=high.

Of course, we also conducted bi-variate analyses. To be able to determine whether events do relate to illness in general, and whether support relates to illness in general, we computed product moment correlations for our total sample. These are shown in Appendix A and B, and will be discussed in the next sections when appropriate.

6.4. Results

6.4.1. Social support in relation to life events

That events coincide with more health complaints can be concluded from appendix A: the number of events or problems and the number of specific complaints are all positively related. The results of testing the hypothesis (figure 6.3) that support buffers the effects of events or problems on reported complaints are shown in table 6.5. The main conclusion to be drawn is that there is just one statistically significant (negative) coefficient in accord with our hypothesis: people who reported social problems requiring emotional support (all problems in our list) and who also have resources available who might give them health-related information, appear to report feeling in bad health less often (coefficient=-.38). What appears more clearly is that people experiencing complaints also receive more support, specifically health-related emotional and -practical support.

Table 6.5. Non-standardized logistic regression coefficients for each type of support per dependent variable, for people with social problems or life events requiring emotional or practical support, analyses are controlled for gender (0=female, 1=male), age (continuous), education (1=low, through 5=high), and number of problems or events in each group of problems of events

	Occurrence of minor complaints	psychiatric complaints	feeling in bad health
1) for people experiencing social problems requiring emotional support (N = 3,226)			
emotional support, not related to health	.21	.16	-.17
practical support, not related to health	.15	.02	-.01
emotional support, related to health	.63***	.32***	.50***
practical support, related to health	.55	.68***	.92***
information, related to health	.01	-.09	-.38***
2) for people experiencing social problems requiring practical support (N = 651)			
emotional support, not related to health	.20	.28	.03
practical support, not related to health	.15	.08	.15
emotional support, related to health	.93**	.32	.36
practical support, related to health	.39	.36	1.42***
information, related to health	-.04	-.09	-.28
3) for people experiencing life events requiring emotional support (N = 2,259)			
emotional support, not related to health	.23*	.57***	.07
practical support, not related to health	.32***	.06	.07
emotional support, related to health	.93***	.65***	.57***
practical support, related to health	1.32***	1.01***	1.47***
information, related to health	-.07	-.03	-.12
4) for people experiencing life events requiring practical support (N = 1,733)			
emotional support, not related to health	.40**	.58***	-.03
practical support, not related to health	.23*	-.01	.04
emotional support, related to health	1.08***	.83***	.59***
practical support, related to health	1.45***	.91***	1.44***
information, related to health	.09	-.16	-.08

Statistical significance: * = $p < .05$, ** = $p < .01$, *** = $p < .001$, T-test

6.4.2. Social support in relation to illness as stressor

All types of self-reported illness are positively and statistically significant related to the "social" duration of illness and disabilities (appendix B). Findings on the hypothesis (figure 6.4) about buffer effects of social support on the "social" duration and disabilities of chronic diseases are in line with the conclusions above (see table 6.6)[7].

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[7] To take the possible confounding effect of severity into account, we also conducted analyses for people with and without chronic comorbidity (not shown here). We found no important differences between these analyses.

Table 6.6. Non-standardized linear regression coefficients for each type of support per dependent variable for people with illness as stressor, analyses are controlled for gender (0=female, 1=male), age (continuous), education (1=low, through 5=high), and number of diseases or complaints in each group of diseases or complaints

	Number of days			Number of disabilities
	neglecting	confined to bed	quieting	
1) for people experiencing chronic diseases requiring emotional support (N = 5,042)				
emotional support, not related to health	.22*	.01	.08	.01
practical support, not related to health	.37***	.05***	.20***	-.03
emotional support, related to health	.60***	.06**	.41***	.11**
practical support, related to health	2.83***	.41***	1.50***	.83***
information, related to health	.11	.02	.09	-.15***
2) for people experiencing chronic diseases requiring practical support (N = 4,362)				
emotional support, not related to health	.21	.01	.10	-.01
practical support, not related to health	.36***	.06**	.22***	-.03
emotional support, related to health	.62***	.06*	.41***	.13**
practical support, related to health	2.81***	.44***	1.50***	.86***
information, related to health	.09	.02	.07	-.17***
3) for people experiencing chronic diseases requiring information (N = 5,509)				
emotional support, not related to health	.17	.01	.08	-.01
practical support, not related to health	.37***	.05***	.18***	-.04
emotional support, related to health	.61***	.06**	.42***	.11**
practical support, related to health	2.81***	.39***	1.43***	.81***
information, related to health	.07	.02	.06	-.15***
4) for people experiencing minor complaints requiring emotional support (N = 6,264)				
emotional support, not related to health	.07	.01	.05	--
practical support, not related to health	.32***	.05***	.18***	--
emotional support, related to health	.48***	.03	.36***	--
practical support, related to health	2.63***	.41***	1.29***	--
information, related to health	.08	.02	.10*	--
5) for people experiencing minor complaints requiring practical support (N = 7,142)				
emotional support, not related to health	.04	.01	.01	--
practical support, not related to health	.31***	.04***	.17***	--
emotional support, related to health	.44***	.03	.33***	--
practical support, related to health	2.69***	.40***	1.31***	--
information, related to health	.05	.02	.07	--
6) for people experiencing minor complaints requiring information (N = 6,874)				
emotional support, not related to health	.06	.01	.02	--
practical support, not related to health	.30***	.04***	.17***	--
emotional support, related to health	.44***	.03*	.33***	--
practical support, related to health	2.68***	.41***	1.32***	--
information, related to health	.05	.01	.06	--

Table 6.6. continued

	Number of days			Number of disabilities
	neglecting	confined to bed	quieting	
7) for people experiencing psychiatric complaints (N = 1,221)				
emotional support, not related to health	-.27	-.09	-.29	--
practical support, not related to health	.59**	.11*	.38***	--
emotional support, related to health	.66*	.10	.52***	--
practical support, related to health	3.52***	.65***	1.68***	--
information, related to health	.52	.01	.28	--
8) for people feeling in bad health (N = 1,693)				
emotional support, not related to health	.41	.07	.25	--
practical support, not related to health	.61***	.12***	.39***	--
emotional support, related to health	.64**	.06	.41**	--
practical support, related to health	2.65***	.47***	1.42***	--
information, related to health	.36	.03	.41**	--

Statistical significance: * = $p < .05$, ** = $p < .01$, *** = $p < .001$, T-test. Regression analyses for people experiencing minor-, psychiatric complaints and feeling in bad health with number of disabilities are not included because these complaints are acute in contrast to the disabilities which may have been present for a longer period of time. These analyses would be causally incorrect.

Health-related support has no buffer effects: people who report a longer duration and more disabilities, receive more health-related support than people who report a shorter duration or fewer disabilities. An exception here is information: people with chronic diseases report fewer disabilities in combination with the availability of sources of information (coefficients are: for chronic diseases requiring emotional support -.15, for chronic diseases requiring practical support -.17, for chronic diseases requiring information -.15, all are statistically significant at a level of $p < .001$).

In all regression equations regarding people with minor complaints, the signs of support-variables are positive, indicating that respondents reporting more days neglecting the routine, being confined to bed and quieting experience more support, health-related[8] or not. Results for people with psychiatric complaints are that health-related support has no buffer effect, and that the possible buffer effects of emotional support not related to health are not statistically significant (coefficients are: for number of days neglecting daily tasks -.27, for number of days being confined to bed -.09, for number of days quieting -.29). That emotional support not related to health might buffer the effects

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[8] We also carried out separate regression analyses for respondents experiencing minor complaints divided in those with and without paid employment. Perhaps people misinterpreted the question about neglecting their daily routine as only referring to work. There are no important differences in signs and statistical significance of coefficients for support variables between employed and unemployed people.
Another possible reason why we did not find any buffer effects could be that the support measures only refer to people outside of the household. For this reason we performed all regression analyses both for people living alone and for those not living alone. Again, no differences were found with regard to buffering minor complaints.

of psychiatric complaints (versus the non-buffering effects of emotional support related to health) may not be strange since our measures of support clearly distinguish between health problems and personal problems. Respondents may view psychiatric complaints as personal problems and not as health problems. Results for people feeling in bad health are all in line with the results for people experiencing minor complaints: people experiencing longer duration perceive more support.

Because most of our respondents report no days of neglecting daily tasks, being confined to bed or quieting at all, and nearly 60 % reports having no disabilities, we decided to perform the analyses shown in table 6.6 for respondents reporting at least one day of being constrained through illness or at least one disability. This may be also another way of controlling for severity of illness to a certain extent. People who have suffered at least some consequences of their illness, as indicated by the report of a disability or a day of quieting etc., may be all more severely ill than people who have not suffered these consequences recently.

In appendix C we show the results of these analyses. They indicate that, to some extent, buffer effects might exist for this group of respondents. More coefficients of support variables show the expected buffer effect, namely 13 as compared to 3 in table 6.6. Nearly half of all coefficients in appendix C appear to have a negative sign (the "sign" of buffering), whereas in table 6.6 only 11 out of all 135 coefficients do. More in detail, the availability of sources of information appears to be related negatively to the number of days being confined to bed and the number of disabilities. Coefficients of emotional support not related to health reach statistical significance in the number of days quieting in the case of people experiencing chronic diseases requiring emotional support (-.25), and requiring information (-.30), and also in the case of people experiencing minor complaints requiring information (-.22). We will discuss these results in the next section.

6.5. Conclusion and discussion

The main result of this chapter is that receiving support does not coincide with better health or less illness in cases of stress. On the contrary, especially perceiving practical support related to health is associated with occurrence of illness, a greater number of disabilities and a longer duration. An explanation for these results has been hinted at earlier by Dunkel-Schetter and Wortman (1982), Avis et al. (1991) and Schwarzer and Leppin (1991). With cancer as the stressful event and symptoms and physical functioning as dependent variables, Dunkel-Schetter and Wortman (1982) conclude that stress can bring about increased support that could mistakenly be viewed as a negative buffering effect even in longitudinal studies. Schwarzer and Leppin (1991) call this phenomenon a "mobilization" effect. In our case this probably means that we did not take the severity of the complaints sufficiently into account, because "mobilization" could be caused by the fact that people who are more severely ill also need more support than those less severely ill. Studies by Ros (1990) and Glass and Maddox (1992) show that buffer effects are found for severely ill people. Schonfeld (1991) argues that when severely threatening life events are rare in a sample, a study does not provide an optimum context for examining stress buffering effects. In this chapter we have tried to take the severity of complaints into account by controlling for the number of events or complaints. We also conducted separate analyses for people who can be considered more severely ill on grounds of other measurements and those who probably are less severely ill. Finally, for illness as stressor, we performed also analyses for people who reported at least one day of being constrained because of their illness or at least one disability, assuming that these people would be more severly ill than people who did not report these consequences. Although we found an increased number of indications of buffer effects for this group, this number was still not very convincing. However, to examine the effect of severity into more depth, one needs a case-control study in which more specific data on physical and mental condition are available.

Systematic buffer effects are not found in our analyses. Buffer effects are found sometimes in the case of information available through persons working in health care: more health-related information available relates to fewer complaints, shorter duration and fewer disabilities for people suffering from chronic diseases. Nevertheless, the number of relationships indicating buffer effects is too small to be conclusive. Support not related to health does not show buffer effects systematically and this type of support does not often show statistically significant relationships at all.

Methodological objections could be made. For instance, we employ cross-sectional data to test hypotheses on a longitudinal process. Still, we hardly ever find buffer effects for support not related to health, while other researchers in this area, also using cross-sectional data, did find buffer effects, for physical illness too. One reason may be for minor complaints, that they usually are present for such a short period that support simply does not get a chance to buffer its course. One could also criticise our measurement of the length of illness behaviour. This length was limited to two months or two weeks before the interview, but this period may have continued after the interview or may have started before the two month or two weeks period. We do not have a remedy for this problem. Further, all measurements were reported by the respondents themselves. For the support measure for instance this means that only people who experienced the receipt of support report this, for people who did not experience support we have no data on support available. Then, there is the problem of matching types of events and support. We categorized events in a rather ad hoc manner. Future studies have to test this categorization. A final remark involves the time-frames of all variables used. Imposing a causal order on the measures used is not that easy, even more so since the support-variables each refer to different time-frames.

But, notwithstanding these remarks, the design of our study has some clear advantages over those of others. For instance, we studied life events as well as illness as stressor. Furthermore, the buffer effects of social support on the occurrence of physical illness have not been studied very often (we can only recall one earlier study: Lin and Ensel 1989). Even more advanced in this field is our investigation into the duration and accompanying disabilities of the illness with regard to illness as a stressor. This clearly fills a gap in the research literature on buffer effects. Not only is physical illness rarely studied, if it is, researchers only examine utilization of health services or recovery (Wallston et al. 1983). There are still other methodological advantages in our study worth recalling. The data are gathered for a representative sample. And most important, the idea of necessity of a match between types of support and illness for the occurrence of buffer effects, has been empirically tested in this chapter. As, in contradistinction to most earlier studies, we have data at our disposal on several types of illness and support, we were able to combine types of support and types of events in our analyses. Although other authors also report on matching events and support (Schaefer, Coyne and Lazarus 1982, Cohen et al. 1985, Dooley, Rook and Catalano 1987, Ensminger and Celentano 1988, Ros 1990, Glass and Maddox 1992, Buehler and Legg 1993), this line of research is rare in the international literature. Unfortunately, we have very few results worth mentioning on the validity of matching types of support and illness.

In considering the properties of our investigations here, we think that the lack of empirical results confirming the buffer effect can not be completely attributed to faults in design and measurement. The only measure of support that shows buffer effects sometimes is "available information". These results are open to several possible interpretations. For one, it may be that social support does not buffer the duration or disabilities of illness in an open population. The events or diseases studied might also be not severe enough for the buffer effect to function. The suggestion for future research to be concluded from this is that social support should be asked for more specifically, in relation to specific events, and that also the measure of illness, or duration and disabilities must be much more specific, and of course, longitudinal.

Another option is to withdraw the mechanism of buffer effects as we described it in terms of actual use of resources. Since health-related information is measured indirectly, as access to health professionals, we probably have measured some kind of integration instead of the receipt of support. The mechanism proposed alternatively is of a more psychological nature. This other possible path consists of direct psycho-physiological changes (like elevated bloodpressure) instigated by members of the social network, that influence disease susceptibility. Less exposure to social contacts then, is expected to produce a worse physiological or psychological status that could produce occurrence of health complaints (Berkman 1985). This possible mechanism is expected to work irrespective of stress level. Analyses shown in chapter 3 indicate that other measures of integration, especially household composition, are positively related to health. Some first provisional analyses on a selection of people experiencing chronic diseases (not shown) indicate that not living alone, being member of a church, being member of a voluntary organization, reporting more friends and a higher number of support-givers overall, is related to reporting less disabilities. The causal direction of these results has to be determined by longitudinal analyses, because it is possible that these measures of integration protect health, but it is also possible that it is health status that determines the degree of social integration. In the next chapter we investigate the effects of health status on the composition of the social network.

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Appendix A. Pearson's product moment correlations for stressful events, types of support, minor complaints, psychiatric complaints and feeling in bad health (N=9,662-10,110)

	minor complaints	psychiatric complaints	feeling in bad health
emotional support, not related to health	.08**	.10**	-.09**
practical support, not related to health	.05**	.04**	-.02*
emotional support, related to health	.19***	.13***	.09**
practical support, related to health	.19***	.17***	.16***
information, related to health	.01	.01	-.11**
social problems requiring emotional support	.42***	.53***	.21***
social problems requiring practical support	.26***	.33***	.12***
life events requiring emotional support	.11**	.13***	.01
life events requiring practical support	.11**	.12**	-.01

Statistical significance: * = $p < .05$, ** = $p < .01$, *** = $p < .001$. Correlations between life events and chronic diseases are not included, because these diseases generally precede the events, and therefore these analyses would be causally incorrect.

Appendix B. Pearson's product moment correlations for illness as stressor, types of support, and consequences of illness (N=9,106-10,110)

	Number of days			Number of disabilities
	neglecting	confined to bed	quieting	
emotional support, not related to health	-.01	.01	.01	-.12**
practical support, not related to health	.04**	.03**	.05**	-.03**
emotional support, related to health	.08**	.04**	.10***	-.03**
practical support, related to health	.20***	.16***	.21***	.22***
information, related to health	-.01	-.01	-.01	-.15***
chronic diseases requiring emotional support	.17***	.11***	.18***	.41***
chronic diseases requiring practical support	.17***	.12***	.19***	.39***
chronic diseases requiring information	.16***	.10***	.17***	.38***
minor complaints requiring emotional support	.12***	.14***	.21***	--
minor complaints requiring practical support	.15***	.14***	.26***	--
minor complaints requiring information	.15***	.13***	.24***	--
psychiatric complaints	.22***	.15***	.26***	--
feeling in bad health	.23***	.13***	.25***	--

Statistical significance: * = $p < .05$, ** = $p < .01$, *** = $p < .001$. Correlations for minor-, psychiatric complaints and feeling in bad health with number of disabilities are not included because these complaints are acute in contrast to the disabilities which may have been present for a longer period of time. These analyses would be causally incorrect

Appendix C. Non-standardized linear regression coefficients for each type of support per dependent variable for people with illness as stressor and at least one day of neglecting, being confined to bed, or quieting, or at least one disability, analyses are controlled for gender (0=female, 1=male), age (continuous), education (1=low, through 5=high), and number of diseases or complaints in each group of diseases or complaints

	Number of days neglecting	confined to bed	quieting	Number of disabilities
1) for people experiencing chronic diseases requiring emotional support				
N =	977	256	984	2544
emotional support, not related to health	-.11	-.11	-.25*	-.01
practical support, not related to health	.30	-.04	.01	.05
emotional support, related to health	.55	.13	-.02	.09*
practical support, related to health	1.30***	.68***	.78***	.77***
information, related to health	-.38	-.48*	-.21	-.11*
2) for people experiencing chronic diseases requiring practical support				
N =	882	239	904	2241
emotional support, not related to health	-.05	-.17	-.25	-.02
practical support, not related to health	.31	-.04	.06	.06
emotional support, related to health	.52	.11	-.07	.09*
practical support, related to health	1.41***	.63**	.74***	.76***
information, related to health	-.46	-.50*	-.22	-.13**
3) for people experiencing chronic diseases requiring information				
N =	1062	271	1042	2638
emotional support, not related to health	-.16	-.15	-.30*	-.02
practical support, not related to health	.28	-.01	-.02	.04
emotional support, related to health	.62*	.11	-.03	.07
practical support, related to health	1.31*	.64***	.68***	.76***
information, related to health	-.43	-.45*	-.20	-.12*
4) for people experiencing minor complaints requiring emotional support				
N =	1318	343	1228	--
emotional support, not related to health	-.26	-.07	-.16	--
practical support, not related to health	.24	.07	.07	--
emotional support, related to health	.68**	.08	.15	--
practical support, related to health	1.49***	.77***	.77***	--
information, related to health	-.45	-.46**	-.10	--
5) for people experiencing minor complaints requiring practical support				
N =	1471	360	1349	--
emotional support, not related to health	-.22	-.09	-.20	--
practical support, not related to health	.20	.04	.05	--
emotional support, related to health	.64**	.09	.11	--
practical support, related to health	1.56***	.73***	.80***	--
information, related to health	-.43	-.37*	-.14	--
6) for people experiencing minor complaints requiring information				
N =	1430	350	1323	--
emotional support, not related to health	-.21	-.08	-.22*	--
practical support, not related to health	.21	.06	.06	--
emotional support, related to health	.62**	.10	.09	--
practical support, related to health	1.56***	.74***	.79***	--
information, related to health	-.46*	-.40*	-.17	--

Appendix C. continued

	Number of days			Number of disabilities
	neglecting	confined to bed	quieting	
7) for people experiencing psychiatric complaints				
N =	390	121	415	--
emotional support, not related to health	-.81	.05	-.19	--
practical support, not related to health	-.07	-.07	.07	--
emotional support, related to health	-.31	-.18	-.32	--
practical support, related to health	1.19^{*}	$.76^{*}$	$.62^{**}$	--
information, related to health	-.28	-.10	.09	--
8) for people feeling in bad health				
N =	488	139	550	--
emotional support, not related to health	-.08	.02	-.08	--
practical support, not related to health	.11	.05	-.08	--
emotional support, related to health	.23	.30	-.08	--
practical support, related to health	.39	.40	$.37^{*}$	--
information, related to health	.12	-.52	-.16	--

Statistical significance: * = $p < .05$, ** = $p < .01$, *** = $p < .001$, T-test. Regression analyses for people experiencing minor-, psychiatric complaints and feeling in bad health with number of disabilities are not included because these complaints are acute in contrast to the disabilities which may have been present for a longer period of time. These analyses would be causally incorrect.

7. Selection in the social network: effects of chronic diseases

7.1. Introduction

The relationship between social networks and health is usually seen as a one-way-direction: social networks affect health (Cohen and Syme 1985). Consequences of (chronic) diseases for the social network have not been under study much yet (although we can mention: Johnson 1991, Lyons 1991, Stoller and Pugliesi 1991, De Witte 1991, Janssen 1992). In general, it is hypothesized that people with a long-standing disease will have a smaller social network and a network that functions less well: the social network deteriorates with the duration of the disease. The theory on this subject is not at all clear on the mechanism responsible in the empirical association between network and illness (Stoller and Pugliesi 1991). The convoy-model expects stability in size (Kahn and Antonucci 1981) but an increased use of the "inner" circle. Because support in case of illness is derived virtually totally from family members (the closest relations according to Kahn and Antonucci, the "inner" circle), and because family relations are relatively stable over time, the network size will remain stable. Litwak theorizes that networks will increase in size in response to greater need for support: when the need for assistance due to diminishing health exceeds the resources of the social network, additional (e.g., professional) helpers will be recruited (Litwak 1985). The definition of social network is important. Litwak takes professionals into account as well as informal network-members. He also showed that professional formal help is no real alternative to informal help for problems of everyday life. Accordingly, we limit the social network of people suffering from a chronic disease to informal contacts only, also because respondents hardly report professional helpers as network-members (Janssen 1992). Another, more practical reason, is that we did not explicitly ask for such formal relations in our questionnaire. Exchange theory also predicts change in network size, but the mechanism here is the balance of give and take in social relations. The exchange partner who is more dependent will attempt to rebalance the relation. An increase in the size of the social network will reduce per capita demands on each helper and lessens the degree of imbalance within a particular relation (Stoller and Pugliesi 1991, p. 181). Janssen (1992, p. 20) argues on the basis of exchange theory that following a chronic health deviation the patient gives less and receives more support, and as a result the network becomes less balanced, and therefore the number of members in the patient's network decreases depending on the degree to which the health deviation is disabling.

We propose yet another, relatively new theoretical perspective, that may explain why some of the theoretical assumptions made by others are not supported by research results: the theory of social capital. Our theory refines the argument of Janssen (1992) through specification of effects on several relation types. Hypotheses derived from this theory will be tested in this chapter.

The theory of social capital assumes that people have access to resources of the people they know (Bourdieu 1980, Flap 1988, Coleman 1988). These resources are called social or "second order" resources, meaning that network-members control the social resources ego has access to (Boxman 1992). In order to achieve certain goals (like health) people use their personal resources (e.g., economic, cultural, physical resources) and their social resources. People with more resources, including social ones, are better able to achieve their goals (Campbell, Marsden and Hurlbert 1986). People obtain social capital by investing in others, that is by way of entering in new relations, or expand or preserve old relations. People invest in social relations to guarantee future access, or to repay investments in the past (Flap 1988). The idea of social capital implies that social resources play a more or less similar role in social life as economic, cultural and other resources do (Flap 1988). Flap (1988, p. 19) stated that social capital is more than a simple count of all people in a network: access to resources does not imply use. Social capital is the result of a) the number of people willing to support, b) the resources that can be mobilized in this indirect manner, and c) the extent in which these people are willing or committed to support. Moreover social resources may be goal-specific, meaning that they can not be used to achieve every goal (e.g., it takes a strong man to carry an invalid, see Litwak 1985). Further, to the degree they are used, some resources (e.g., social support) can become exhausted. We assume that social resources are involved in the mechanism operating in the relationship between chronic diseases and network characteristics.

In this chapter we explore so-called selection effects. To maintain their social network, people have to invest in social relations and to repay prior investments made by others. Fischer et al. (1977) already underscored the influence of all kinds of constraints on the emergence and change of social networks. Illness as such is yet another restraint on network formation. Chronic illness may be detrimental to people's social networks in two ways. First, limitations caused by illness will limit the opportunities for new contacts. Ill people generally also have fewer resources to spend on others, e.g., even money (Fischer 1983). These limitations can also make it difficult for a sick person to invest in his social relations. Because of a growing inability to get to places, to function as before, opportunities for social interaction (to continue shared activities and thereby invest in social relations) will become limited when ego develops a chronic disease (Rounds and Israel 1985, Lyons 1991, Stoller and Pugliesi 1991, Janssen 1992). Adams (1967) uses the concept of social relations based on concern or consensus in this respect. Social relations based on consensus only, on shared activities, are more likely to disappear as a consequence of the development of a chronic disease than social relations also based on concern (love, care). A further refinement can be made in terms of uniplex or multiplex relations. "Ties" to people with whom one shares only one type of activity, a so-called uniplex relation (Tolsdorf 1976), are especially vulnerable when ego is no longer able to continue this activity. A second reason for deterioration of people's social networks through chronic illness may be that the use of resources vested in social relations may become exhausted: the sick person requires more investments, social support, from his supporters than he ever will be able to pay back. A relation may break up not only because the supporter is no longer willing to support (because he no longer feels indebted and sees no future repayments for his services from the ill person, see for instance: Rounds and Israel 1985), but also because the sick person does not want to be a burden any longer (Joosten, Van der Horst and De Witte 1986).

Our data are cross-sectional, which limits the possibilities of investigating these general hypotheses. If we were to compare the social networks of those suffering from a chronic disease with the social networks of those not suffering from any disease, the results would be open to several interpretations. A difference in network size for instance could be caused by differences in size between those two groups before disease onset. If this is the case, we cannot establish the effects of the chronic disease on the social networks. We decided therefore to investigate the effects of the duration of the disease on the social network. When a chronic disease is present for a longer period of time, the patient will usually develop more limitations and become more dependent on others and relations will break off sooner.

Different diseases will not impair social networks in the same way. It depends on the nature of restrictions in functioning people have to cope with because of illness, these limitations can be more or less severe (see for instance: Lyons 1991). Also, the type of illness matters: some illnesses cause more anxiety because they are more life threatening, are progressing rapidly, or produce symptoms which are more visible (Janssen 1992), and scare people off (cancer, aids). We call these three factors (functional disability, visibility, and threatening nature of the disease) the "social" severity of a chronic disease. We expect that the more social severe a disease is, the more the person who suffers from this disease will experience deterioration of his or her social network.

The structural circumstances people live in, indicated by life cycle stage, gender, education and degree of urbanization, are also important for the magnitude of expected changes through the development of a chronic disease. The consequences of a chronic disease for the social network are probably less severe for older people, because they are already confronted with a decline in social contacts through aging (Shulman 1975, Fischer and Oliker 1983). Gender, education and degree of urbanization also appeared to be major determinants of social network characteristics (see chapter 2, and Marsden 1987). For instance, women report having more friends and more people they can rely on for support than men. People with a lower educational level also report having more friends but name fewer people they rely on for support than highly educated people. And people who live in large cities report very few friends but more support-givers compared to people living in small cities (chapter 2).

To develop more specific hypotheses, we must distinguish social relations according to the amount of investments, and the extent of shared activities performed (uniplex versus multiplex relations). Relations of longer duration, usually like those with kin, will have a longer history of investments, and will therefore more probably continue when someone develops a chronic disease. Persons with whom one performs activities, as colleagues or co-members of organizations, are likely to disappear when someone develops a serious chronic disease because one is no longer able to share in these activities and there seem to be no alternatives (goal-specificity of relations). Since the sick person is in greater need of social support but is not able to repay any services, only those relations will remain that entail more possibilities to give support (like with people living nearby). An interesting group in this respect are women. In the Netherlands the participation of women in the labour force is still rather low compared to other European countries (Hooghiemstra and Niphuis-Nell 1993), most women stay home most of the time and are therefore more available to give support. In general, since the patient himself is not able to repay services, repayment may be accomplished by prior investments or by services rendered by third parties. In dense personal networks, A may be repaid for something A did for B by C, because B did something for C once. The remaining personal network will probably have a more dense structure, because people in the network have to be connected to make this type of repayment possible.

To sum up, the central hypothesis to be tested in this chapter is that *personal networks of chronically ill will be negatively affected by the duration of a disease, and even more when the disease is more "socially" severe*. Because we do not incorporate professionals in our definition of the social network, this hypothesis differs from the one Litwak (1985) stated. Reasons to expect this decline can be found in the theory of social capital and the exchange theory (Janssen 1992): a) either the ill person or the network-member will break off an existing contact because of little investments in the past, which results in fewer feelings of debt on the side of the network-member, or in a growing imbalance in the relation (and both the sick person and the network-member have reasons to avoid unbalanced relations), or b) the contact is lost since the ill person shared activities with the network-member that he or she is no longer able to perform, or because c) people with a chronic disease have fewer possibilities to make new contacts. These specific reasons cannot be tested with our data. What can be tested are the results of these reasons for the composition of the social network, in which we follow our theory of social capital and the convoy-model of Kahn and Antonucci (1981). We expect that *the duration of the disease will affect the social network in such a way that the proportion of women, kin, long-standing relations and people living nearby will be higher for people suffering from a disease longer. Contacts with colleagues, friends, support-givers, and membership of organizations will be affected by the duration of the disease negatively.*

To test these hypotheses about selection effects of sickness on social networks we will analyze the effects of duration of diseases on the network characteristics mentioned above. But first we will describe our data and the measurements used.

7.2. Data and measurements

Data was gathered as part of the national survey "Morbidity and Interventions in General Practice" (Foets, Van der Velden and De Bakker 1992) by means of a health interview. Respondents were selected through the administration of 161 general practitioners. Since nearly all inhabitants of the Netherlands are registered with a general practitioner and since the sample is quite similar to the Dutch population (Foets and Van der Velden 1990), our sample is representative. The total sample includes 17,047 respondents, the response rate is 77 %. We only present findings for respondents aged 18 and over (N=10,110).

For all analyses respondents who report a specific chronic disease were selected. The presence of a chronic disease was measured by a checklist developed by Van den Bos (1989). For each of 23 diseases[1] the respondent filled in whether he or she had this disease and, if so, since when. Prevalence figures for chronic diseases range from 1 to 15 % (see table 7.1). A duration of 0 years refers to suffering from a disease for less than 1 year.

Most people in the population experience one or more chronic diseases (55.1%). 50 % of all people who do experience chronic diseases, experience more than one. These chronic diseases may be categorized in groups according to their severity. For the purpose at hand we categorized the chronic diseases according to three dimensions of social severity: visibility of the disease for others, threatening for others, and functional disablement of the disease which may cause a need for help from others. With the help of this categorization we distinguished people with mildly, moderate and severe chronic diseases. In table 7.2 we present our categorization. Categorization took place on a rather ad hoc basis. Since no publications on the social severity of diseases are known to us, we categorized the diseases ourselves. The usefulness of this categorization will be discussed later.

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[1] Respondents with asthma or chronic bronchitis (which also includes emphysema) were included together. Respondents suffering from heart complaints or cardiac failure were also included together, because these diseases belong to the same groups in terms of symptoms and social severity. The original list consists of 25 diseases plus an "other" category. This "other" category was excluded because of suspected minor reliability.

Table 7.1. Chronic diseases, occurrence (percentage) and duration (N=10,110)

	occurrence	duration in years		
		range	mean	standard deviation
arterio-sclerosis	0.7	0-22	6.9	6.2
backache (slipped disc, sciatica)	15.2	0-76	12.5	11.1
chronic bronchitis/emphysema, or asthma	7.7	0-83	21.1	17.7
chronic gastro-intestinal disorders	4.4	0-54	12.4	12.1
chronic skin diseases/eczema	6.0	0-72	14.1	13.4
diabetes	2.3	0-73	9.7	11.6
diseases of the nervous system (Parkinson's disease, multiple sclerosis, epilepsy)	1.4	0-59	15.2	13.5
gall-bladder and liver diseases (incl. bilestones)	1.3	0-67	11.8	12.5
haemorrhoids	9.3	0-72	12.4	12.6
hay fever	4.7	0-83	14.7	13.2
heart complaints, or cardiac failure	6.4	0-77	9.3	11.4
hereditary handicaps	0.5	2-83	42.0	21.3
hypertension	9.5	0-73	9.8	10.1
kidney diseases (incl. kidney stones)	1.7	0-64	14.4	12.8
menstruation/menopause complaints[1]	3.2	0-62	10.2	10.0
migraine/chronic headache	10.6	0-79	15.6	14.2
neoplasm/cancer (incl. leukaemia)	1.1	0-37	5.8	6.4
prostatism/prostatitis[2]	1.2	0-37	4.9	6.3
rheumatism/arthritis/arthrosis	3.7	0-69	11.5	11.4
serious consequences of accident	2.8	0-70	13.7	14.0
thyroid gland diseases	1.3	0-63	13.0	12.6
ulcus cruris	0.3	0-62	13.9	14.5
varices	8.7	0-76	17.9	14.1

[1] for women only; [2] for men only

Network characteristics can be distinguished in three types (chapter 2): social integration, the content of social relations (e.g., social support), and social network structure. Indicators of social integration in our survey are: church-membership and church-attendance, membership of voluntary organizations, work outside the house, number of close friends, and number of people providing support. We combined church-membership and -attendance to measure active membership (coded 0 or 1, resp. no active membership (including non-members), or active membership). Of all selected respondents (N=5,571), 32.2 % report being active in church. Membership of voluntary organizations was also coded no or yes. More than half of the selected respondents (53.1 %) report being member of voluntary organizations. A further characteristic of social integration is work outside the house. This is broadly defined as having a job or other activities outside the household that could provide for social contacts. Having a job, doing voluntary work or being in full-time education (47.9 %) are all supposed to indicate integration in the work force (formally as well as informally). Housewives (-men) and pensioners are not supposed to be integrated in the work force.

Table 7.2. Categorization of chronic diseases according to social severity

	visibility	threatening	functional disabling
Mild chronic diseases:			
hay fever	+	0	0
haemorrhoids	0	0	0
hypertension	0	+	0
menstruation/menopause complaints	0	0	+
migraine/chronic headache	0	0	+
diabetes	+	0	0
Moderate chronic diseases:			
varices	+	0	+
backache (slipped disc, sciatica)	+	0	++
prostatism/prostatis	0	+	+
chronic bronchitis/emphysema, or asthma	+	+	+
serious consequences of accident	+	0	+
chronic gastro-intestinal disorders	0	+	+
gall-bladder and liver diseases (incl. bilestones)	0	+	+
kidney diseases (incl. kidney stones)	0	+	+
thyroid gland diseases	0	+	++
heart complaints, or cardiac failure	0	++	+
arterio-sclerosis	0	+	++
hereditary handicaps	+	0	++
Severe chronic diseases:			
chronic skin diseases/eczema	++	++	0
ulcus cruris	+	+	++
rheumatism/arthritis/arthrosis	+	+	++
neoplasm/cancer (incl. leukaemia)	+	++	++
diseases of the nervous system (Parkinson's disease, multiple sclerosis, epilepsy)	+	++	++

0 = no or hardly any social severeness expected; + = mild social severeness expected; ++ = extreme social severeness expected

The number of close friends was measured by the following question: "How many people do you consider to be real friends? (take only friends from outside the household into account)." The mean number of friends for our respondents is 6.64. We describe the measurement of the number of people providing support below.

The second type of indicator concerns support. To assess the amount and kinds of social support people experience we used the exchange method (Fischer 1982). Respondents were requested in each question to name maximally three members of their network, of people outside the household. We asked six name-generating questions, each referring to the provision of a specific type of social support[2]. We combined

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[2] The name-generating questions in our survey were: "The following questions deal with a number of things you do together with other people, or for which you make an appeal to others. The questions concern those people not living in the same household as you are. The questions do concern other kin, friends, acquaintances, neighbours etc. A. Do you talk with people when you have problems with your health? B. When you have a personal problem, do you talk about this with other people? C. Did you receive any help or assistance from people, with regard to a disease in

all items to compute sum-scores for the number of support-givers. The number of support-givers ranges from 0 to 6 (mean for our sample is 3.94). For the purpose of this chapter we only use this number of support-givers in our analyses. Since we do not investigate the content of specific relations, we may label this number an indicator of social integration.

The third type of indicator concerns the structure of the social network. The measures we were able to construct relate to the support-giving network: proportion of kin, proportion of women, proportion of colleagues, proportion of long-standing relations and proportion of people living nearby. For at maximum six network-members named by the respondent as support-giver, we obtained information on gender, type of relation (kin, colleague, etc.), duration of the relation and travelling distance. These proportions were calculated by comparing the number of kin, colleagues, women, long-standing relations (longer than 10 years[3]), or people living nearby (travelling time of at maximum 10 minutes), with the total number of support-givers. As we said before, we are assuming that kin, women, long-standing relations, and people living nearby all reflect large investments in the past and/or a greater number of activities shared. Colleagues are generally supposed to have uniplex relations with the respondent. Respondents in our sample report a mean percentage of women of 60 in their network, for kin this is 44 %, for long-standing relations 61 %, and the mean percentage of people living nearby among support-givers is 55 %. The mean percentage of colleagues is rather low compared to the percentages give above: 4 %.

Analyses are controlled for gender of the respondents (0=female, 1=male), education (1=low, 5=high), degree or urbanization of their place of residence[4] (1=low, 3=high) and life cycle stage. The sample of respondents reporting chronic diseases consists of fewer males than the sample of those not reporting a chronic disease (44 % versus 54 %), and the educational level in our selection of respondents is somewhat lower than in the more healthy group (Pearson's X^2=255.2, df=4, p < .001). People reporting chronic diseases appearently do not differ in degree of urbanization from those not reporting a

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the last few months? (e.g., shopping, getting medicines) D. Did anyone help you with jobs around the house in the last few months? (e.g. painting, repairing things, cleaning up, cooking). E. When you are away for a longer period of time, do you ask someone to watch the house, water the plants etc.? F. Did you visit anyone last month, or did anyone visit you, or have you been out with people?" For each item the next question was: "Can you tell me the names of a maximum of three persons?"
After this first part of the network-measurement the interviewer put the first-mentioned six names on a list. All first mentioned names were listed. When the first names for several items were the same, the second names were used so that six different names were listed.

[3] After how many years do you call a longstanding relationship longstanding? Rather arbitrarily we choose to follow Litwak (1985) in this respect and defined longstanding as longer than 10 years.

[4] We used the categorization of degree of urbanization as developed by the CBS (Foets and Van der Velden 1990). A "low" level of urbanization refers to municipalities with a population of less than 30,000, "intermediate" = 30,000 through 50,000, and "high" = over 50,000 inhabitants. This degree indicates the relative size of the place of residence of the general pratitioner with whom the respondent is registered. We must assume that the respondent lives in the same area.

chronic disease: 21 % lives in highly urbanized areas. Life cycle stage was indicated by the combination of three personal characteristics: age (in three groups: 18-30 years, 31 to 55 years, and 55 and over), partner status (yes or no), and having children (yes or no). The combination of these three characteristics produces 12 groups, for each age group 4 combinations of having children and partner status are possible. The most common life cycle stage in our data are the people in the age of 30 to 55 with a partner and children (37.2 %), the life cycle stage that is least present are the people in the age of 18 to 30 without a partner but with children (0.9 %).

7.3. Methods

To test the hypotheses mentioned, we conducted multiple regression analyses. Dependent variables are the network characteristics. For membership of church, membership of other voluntary organizations, and work outside the house, we performed logistic regression analyses because we coded these variables 0 or 1 (Hosmer and Lemeshow 1989). Since the proportion of colleagues was 0 for over 80 % of our respondents, we coded this variables also 0 (for no colleagues mentioned) or 1 (1 or more colleagues). For all other network characteristics it was possible to perform linear regression analyses[5]. Because respondents reported suffering from more that one chronic disease frequently, we determined the duration on the basis of the oldest most severe chronic disease. We performed regression analyses with one of the network characteristics as the dependent variable, and with the duration (in number of years) as the main independent variable. Separate analyses were conducted for people with socially severe, moderate or mild diseases. All analyses were controlled for gender, education, degree of urbanization and life cycle stage at the time of the interview. Analyses were performed in forced steps. In the first step all variables in control are entered in the model. In the second step duration of the disease is entered. We show the change of fit of the model with duration of the disease as compared to the model without disease duration (table 7.3: change in deviance, and table 7.4: change in R^2). All coefficients were tested for significance at a one-tail $p < .05$ level.

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[5] Because the proportion of kin, women, people living nearby, and of long-standing relationships range from 0 to 1, these dependent variables have to be transformed by $\sin^{-1}\sqrt{(y)}$ to be able to apply linear regression analyses according to Weisberg (1985). Since fitting results with regard to residuals and outliers obtained by using this transformation were not better than by using the original coding, we decided not to transform these variables.

7.4. Results

A general conclusion from our analyses must be that the relative contribution of duration to the regression equations is rather small. For more detail see table 7.3 and 7.4.

Table 7.3. Results of logistic regression analyses to determine associations between network characteristics and duration of a chronic disease, controlled for gender, education, degree of urbanization, and life cycle stage

	N	Log-likelihood	Change in deviance	B
Dependent variable: active churchmembership				
duration of severe diseases	1,012	1,279.35	0.01	.01
duration of moderate diseases	2,633	3,326.86	0.01	.01
duration of mild diseases	1,226	1,516.33	0.26	-.01
Dependent variable: membership of voluntary organizations				
duration of severe diseases	1,012	1,401.02	0.16	-.01
duration of moderate diseases	2,633	3,638.21	0.96	-.01
duration of mild diseases	1,226	1,692.98	0.26	.01
Dependent variable: work outside the house				
duration of severe diseases	1,012	1,375.58	1.11	-.01
duration of moderate diseases	2,633	3,633.82	8.47	-.01**
duration of mild diseases	1,226	1,680.70	2.04	-.01
Dependent variable: colleagues in the social network				
duration of severe diseases	935	555.74	1.74	-.01
duration of moderate diseases	2,396	1,366.51	0.30	-.01
duration of mild diseases	1,134	708.76	1.49	-.01

Table 7.3 presents the results for logistic regression analyses. Although some coefficients for duration of severe chronic diseases appear to be negative as expected, indicating fewer chances of membership, work outside the house, and colleagues with a longer duration of diseases, only one coefficient is statistically significant (the relationship between duration of moderate diseases and work outside the house).

Results for linear regression analyses are presented in table 7.4. To recall our hypotheses, we expected a longer duration to be related to fewer friends and fewer people who give support. Further, we expected a longer duration to be related to a higher proportion of women, kin, people living nearby, and long-standing relations.

Table 7.4. Results of linear regression analyses to determine associations between network characteristics and duration of a chronic disease, controlled for gender, education, degree of urbanization, and life cycle stage

	N	Change in R^2	B (non-standardized)
Dependent variable: number of friends			
duration of severe diseases	913	.005	-.04*
duration of moderate diseases	2,308	.001	.02
duration of mild diseases	1,095	.005	.04*
Dependent variable: number of all support-givers			
duration of severe diseases	1,012	.007	-.01**
duration of moderate diseases	2,633	.001	-.01
duration of mild diseases	1,226	.001	.01
Dependent variable: proportion of women			
duration of severe diseases	981	.001	.01
duration of moderate diseases	2,493	.001	-.01
duration of mild diseases	1,179	.003	-.01*
Dependent variable: proportion of kin			
duration of severe diseases	981	.002	.01
duration of moderate diseases	2,493	.001	.01
duration of mild diseases	1,179	.001	-.01
Dependent variable: proportion of people living nearby			
duration of severe diseases	981	.001	-.01
duration of moderate diseases	2,493	.001	-.01
duration of mild diseases	1,179	.001	.01
Dependent variable: proportion of long-standing relations			
duration of severe diseases	981	.001	.01
duration of moderate diseases	2,493	.001	-.01
duration of mild diseases	1,179	.001	.01

The results indicate some, but little support for our hypotheses. A higher number of friends and of supporters appears to be related to a shorter duration of socially severe chronic diseases, as expected. These results are quite different for people suffering from mild diseases. A higher number of friends is related to a longer duration of mild diseases. And people suffering from mild chronic diseases for a longer period of time also appear to have more women in their support-giving network than people suffering from these diseases for a shorter period of time. Apparently, the social network of people suffering from socially mild diseases is not negatively affected by the duration of the disease. Further, a higher proportion of women, kin and long-standing relations appears to be related to a longer duration of severe chronic diseases, as we expected, but these coefficients are not statistically significant.

7.5. Conclusion and discussion

Our theory of social capital led us to expect that chronic illness would cause personal networks to deteriorate. We expected chronic diseases to differ in social severity, in the consequences these diseases would impose on the social life of the patient. As a test we analyzed relationships between personal networks of people and duration of three groups of diseases: socially severe, moderate and mild chronic diseases. We assumed that duration of diseases would be related to less involvement in church, in other informal organizations, and in work outside the house, and to fewer friends and colleagues left in the network. With regard to support we expected that duration of diseases would be related to receiving less support. Duration of diseases would be related to the structure of the personal networks in such a way that the proportion of women, kin, long-standing and nearby living relations would be higher for people suffering from a disease longer.

On the basis of our results we must conclude in general that duration of disease does not have much effect on the personal network. Only for social moderate and severe chronic diseases do we find some relationships that are in line with our expectations and are statistically significant. For social severe chronic diseases we find negative relationships between the number of friends or the number of supporters, and the duration of these diseases. People suffering from social moderate diseases for a longer period of time appear to be involved in work outside the house less often than people suffering from these diseases for a shorter period of time. None of the statistically significant results we can report on mild chronic diseases is in line with our expectations. The number of friends appears to be positively related to duration, and the proportion of women is negatively related to duration for these diseases.

Our results are rather disappointing in the sense that they do not present much evidence for selection effects triggered by disinvestment in each other. We estimated effects of duration of diseases on social networks in a cross-sectional design. This is, of course, not optimal. We would have liked to conduct a longitudinal study of people, not chronically ill at time 1, and following them through time. Some of them would eventually develop one or more chronic diseases. Such a research-project would have been rather costly and time-consuming. But other methods, we think, would be biased. For instance, when we compare personal networks of chronically ill and a matched healthy group, there is always a chance of mixing effects of networks on diseases with effects of diseases on networks. An example of this method is the longitudinal study of Janssen (1992). She compares the personal networks of a healthy group with those of patients suffering from Ankylosing Spondylitis or Crohn's disease on three occasions. The patients report fewer informal network-members and less emotional support received from them than the healthy group. The size of the network shrinks when the disease is present for a longer period in Janssens study (1992).

An alternative method used several times, is a longitudinal study on patients, and comparing their personal networks at several points in time. Results may be biased in this type of study when time intervals are chosen such that network changes remain undetected (Schulz and Tompkins 1990). De Witte's multi-wave study on patients suffering from Spinal Cord injury, Ankylosing Spondylitis and Rheumatoid Arthritis is a good example (1991). He reports a smaller network, fewer friends and other non-kin relations for patients at time 4 (two years after admission to a rehabilitation centre) than at time 1 (admission). Between time 1 and time 4 (at discharge and three months after discharge) the personal networks first shrink pretty much, then grow a bit, and finally end at a smaller size than at time 1.

The studies of Janssen (1992) and De Witte (1991) in part used the same measurement of personal networks. They both invited the respondents to name the people with whom they had good personal ties. This method seems more adequate than asking people about specific transactions, because not being able to perform these transactions would bias the network size. A study that did measure network size by counting the number of support-givers apart from an eventual partner, showed that network size increases from time 1 to time 2 (Stoller and Pugliesi 1991). The respondents, elderly people, developed more disabilities, and needed and received more support at time 2 than at time 1.

A general remark on all these studies, is that they did not incorporate "traditional" measures of the personal networks: measures of social integration. According to Kahn and Antonucci (1981), the "inner" circle, consisting of people close to the person at focus, would not be affected by the onset of a chronic disease. But the "outer" circle, of less close contacts certainly would. Johnson (1991), in his study on mental health and social selection, showed that more distress at time 1 is related to less primary ties (indicating the "inner" circle, consisting of close friends and relatives) at time 2. Secondary ties (indicating the "outer" circle, measured by the number of voluntary groups or organizations one participates in, and church-attendance) at time 2 were not affected by distress at time 1. Our results indicate that the "outer" circle (measured by active church-membership and membership of voluntary organizations) is not affected.

After having described other studies and their weaknesses, it is time to discuss the limitations of our study. Our research population consists of a representative sample of the Dutch, of whom 55 % reported suffering from one or more chronic diseases. These diseases as well as the duration of these diseases are self-reported. We have no reasons to doubt these data. One may have doubts on the categorization of social severity we used here. Since the duration of severe and moderate chronic diseases clearly has other effects on social networks than duration of mild chronic diseases, we think our distinction makes sense. It would be preferable, of course, to construct a categorization in a more profound way.

A further comment can be made on the measurements of the social network. For instance, for chronically ill, having work outside the house is, in the Netherlands, also directly determined by health status. Not only because chronically ill very often are less able themselves to participate in the work force. As a consequence of the national social security system, people who are ill longer are assessed medically to determine whether they are able to work any longer. People who are ill for a longer period may get debarred of paid labour by this social security system. Having no work outside the house is, in our measurement, not restricted to paid labour. For instance, people who participate in voluntary work are also considered to work outside the house. Thus, chronically ill people who are still able to perform activities outside the house and who actually perform such activities, are also considered as such in our study. Our measurement of the number of support-givers (and related to this also our measurements of structure of the social network which concern only the support-giving part) is limited to a maximum of six persons. We would have preferred a longer list of name-generators of support-givers and their characteristics.

One can also question our hypotheses, more specifically the assumptions on the nature of the relationship between disease duration and social network. We assumed this relationship to be linear. It seems possible that the effect of the development of a chronic disease for the social network is positive at first, later on negative, and stable in the last stage. Through the emergence of a disease, many people will visit the patient. As a result of getting used to the disease, persons may lose interest in the patient, or the patient may lose interest in the others persons, and the mechanism of deterioration starts working. In the last stage the patient has become accustomed to his disease and may start to rebuild his life again and also his social network. Whether this stage process actually operates must be investigated on specific diseases, following the people who suffer from these diseases and their social networks from disease onset through a longer period of time.

The selection of severe chronic diseases for this kind of research seems an important reason for the fact that we do find some small effects of duration on characteristics of the social network and that other studies (on severly ill patients) report much greater effects. Nevertheless, since our data include many respondents and measurements with regard to chronic diseases as well as with regard to the social network, we think we have a point here. After taking the effects of gender, education, degree of urbanization, and more important of life cycle stage and work status into account, the duration of diseases hardly has any effect on social network characteristics. The design of the study and the variables in control should be considered thoroughly by future researchers.

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8. Summary and conclusions

8.1. Introduction

This book is about social networks and health. Central to the study was first the lack of adequate data on social networks and health within research literature in the Netherlands, and second, the lack of a comprehensive theoretical idea to explain the several pathways between networks and health. We try to make some progress on both counts and test a number of hypotheses flowing from the new theoretical interpretation we offer.

In the Netherlands, research on social networks and on their relationships with health, has been limited to specific groups of people and their specific problems. Recently, several books on social networks and their causes and consequences have been published to which a number of Dutch researchers have contributed (Knipscheer and Antonucci 1990, Weesie and Flap 1990, Jansen and Van den Wittenboer 1992). With the exception of Jansen and Van den Wittenboer (1992), who published our overview of network characteristics for the Dutch population in general, the research thus far did not provide such a point of reference. In consequence, we started this book with our report on the social networks of the Dutch (chapter 2).

As a logical next step we dealt empirically with the relationship between networks and health. Research into the influence of a person's social network on diverse aspects of health has been carried out over the last twenty years. The astonishing results of Berkman and Syme (1979) are a landmark in this research literature. "Ever since Lisa Berkman and Leonard Syme reported that people in Alameda county, California, who had a lot of friends and relatives and saw a lot of them were likely to live longer than those who seldom visited with friends and relatives, medical sociologists have felt an important connection has been established between social behaviour and health status" (Elinson 1985). When mortality is not the focus of research, but morbidity, results are less clear. In the Netherlands, this kind of research has been limited to specific groups of patients. In chapter 3 we described relationships between indicators of social networks and health for a cross-section of the Dutch population.

Relationships between social networks and health are usually described in terms of buffer or direct effects. The buffer hypothesis states that social support leads to improved health through buffering of stress. According to the direct effect hypothesis, social networks, or social integration, lead to greater health irrespective of the level of stress. In chapter 4 we specified these possible mechanisms with the help of the theory of social capital. Use of this theory provided some theoretical integration where formerly there was less. Further more, this theory made it possible to derive new hypotheses and explain why existing research did not always support the old hypotheses which existed within the field. Direct effects are supposed to be at work because of social regulation of health behaviour. Buffer effects occur when the type of support provided matches the need for support brought up by an event or disease. Through the use of the theory of social capital we also were able to specify the reversed mechanism of selection effects of health status on social networks. We argued that diseases can be distinguished according to "social" severity: socially severe diseases will involve more consequences for the composition of an individual's social network than socially mild diseases.

The next three chapters showed results of investigating these mechanisms empirically. In chapter 5 we studied relationships between indicators of social regulation through the social network and health. It appeared that social networks are related to health behaviour. But the direct effects of network characteristics on health remained after controlling for social regulation. Chapter 6 concerned the possible buffer effects of different types of social support on consequences of several types of stress. Matching the types of support and types of stress, the analyses mainly showed the mobilization of support: people who were more ill also reported to receive more social support. Finally, chapter 7 dealt with effects of duration of disease on the composition of the social network. Only a longer duration of socially moderate or severe diseases was related to a smaller network. For socially mild diseases we could not find these relationships.

In this last chapter we summarize our findings, draw conclusions as to the value and strength of our explanatory argument, and discuss theoretical and methodological problems we faced during the study.

8.2. Summary

The data on which all analyses in this book are based were collected as part of the "National Study of Morbidity and Interventions in General Practice" by means of health interviews (Foets, Van der Velden and De Bakker 1992). A number of questions in this interview related to the health status and social networks of respondents. Respondents were randomly selected through the administration of 161 participating general practitioners. The total scope of the selection included 17,047 respondents; the response rate for the sample was 76.6 %. Since nearly all inhabitants of the Netherlands are registered with a general practitioner and since the sample was quite similar to the Dutch population in several respects (Foets and Van der Velden 1990), our sample can be considered as representative. We only presented results for respondents aged 18 years and over (N=10,110), since it can be assumed that this group decides more autonomously on composition of its own network than younger respondents. Our data contained information on each of the three approaches in network studies: the approach of social integration/isolation, the social support approach, and the social network or structure approach (House and Kahn 1985, Dykstra 1990).

Social networks of the Dutch

Before we started this study, research on social networks in the Netherlands focused on specific problems of particular groups of persons, such as, for example, people suffering from a certain kind of disease. During our study, Felling, Fiselier and Van der Poel (1992) published a study in the Netherlands using one particular approach, e.g., giving and receiving social support. We describe the social networks of the Dutch in terms of all three approaches common in research on social relations. These approaches are directed at different characteristics of social networks. The social integration approach is limited to establishing the presence or absence of particular types of social relations. Researchers who use the social support approach see the quality of these relations as the central issue, indicated by the exchange of social support. The social network or structure approach uses structural characteristics of the respondent's network (for instance, its density, or heterogeneity).

Social integration was indicated by composition and size of the household, membership of voluntary organizations, membership of church and church-attendance, work status, number of "true" friends, and number of support-givers. A majority of the Dutch (85 %) appeared to live with one or more others, 60 % were members of voluntary organizations and almost 25 % attended church on a regular basis. Nearly 60 % of all Dutch appeared to be involved in work outside the house. On average, the Dutch had 6 "true" friends. Respondents reported on average nearly 4 names of people they received support from.

With regard to the social support approach we recorded the number of names the respondents reported in response to 6 name-generating questions. These questions concern areas in which support has been needed in the last months before the interview. At maximum, 6 names were recorded. When we looked at the specific areas for which names are given, it appeared that nearly all Dutch can mention names of people who did visit them or whom they had visited during the last month before the interview. Very few respondents were able to report names in response to the question on support received in the case of illness in the previous month. Probably, many people were not ill in that month and were therefore not able to mention names.

For the social network approach we computed the proportion of kin and heterogeneity with regard to gender and labour market participation in the support-giving network. Our findings showed that the proportion of kin in the support-giving network was 41 % and that this part of the network was rather homogeneous with regard to gender and labour market participation.

In order to facilitate comparison with other studies, we described the characteristics of social networks also in relation to gender, age, education and degree of urbanization of the place of residence of the respondents. These characteristics showed to be nearly always related to all three types of social network characteristics. Interesting is that our data indicated that especially education and degree of urbanization have strong relationships with characteristics of social networks. For instance, highly educated people were more often a member of voluntary organizations, but less often a member of a church.

They were able to mention more names of people who provided support but they reported fewer kin as support-givers than those with a lower level of education. People in large cities were less often members of voluntary organizations or a church, lived in smaller households, but were able to mention more names when asked about support-givers then people who lived in rural areas. People living in large cities also reported fewer kin as support-givers and less "true" friends than people in rural areas.

Missing data are extremely important for network analyses since it seems, for instance, that data on weaker relations are more likely to be missing (Burt 1987). Our data revealed that network-members on whom the respondent did not provide all information had less frequent contact with the respondent. Respondents who did not provide all network data were more often female, elderly, and more often lived in large cities. Nearly 90 % of our respondents reported all information on their support-giving network. Therefore, we concluded that the problem of missing data on social networks in our data was not very large.

Characteristics of social networks and health

In chapter 3 we investigated relationships between social networks and health for our representative sample of the Dutch population. The indicators of the three types of social network characteristics (integration, support, and structure) were related to self-reported chronic diseases, minor complaints, psychiatric complaints and experienced state of health. Three important determinants of health (gender, age and education) were taken into account, because we wanted to know whether relationships between characteristics of networks and health were influenced by these determinants.

Logistic regression analyses showed that characteristics of integration, like household composition and number of household members, the number of "true" friends, having work outside the house, active membership of church and membership of voluntary organizations, were positively related to health, also when we took gender, age and education into account. This was not the case for the more objective measure of chronic diseases: after taking these socio-demographic characteristics into account, social integration was no longer related to the occurrence of chronic diseases. Only people having work outside the house appeared to report also less chronic diseases than people without work outside the house. Characteristics of the structure of social networks, like, i.e., proportion of kin, proportion of long-standing relations, and heterogeneity of gender and labour market participation were rarely related to health when gender, age and education were taken into account. The receipt of several types of support and the number of support-givers were related to illness positively: people who reported more support also reported more diseases and complaints. Gender, age and education appeared to have an influence on the relationships between social networks and health, in the sense that some relationships changed after taking these characteristics into account.

Mechanisms in the relationship between social networks and health

Questions as to why social networks are related to health have, within the relevant research literature, remained largely unanswered. Several mechanisms underlying this relationship are suggested but have not been studied empirically in a systematic way. We argued that two behavioural mechanisms (social regulation, and provision of support in times of need), together with a reverse mechanism (health status influences the social network), can be described in terms of the theory of social capital. This theory not only provides a description of these three different mechanisms. With the help of this theory it is also possible to specify existing hypotheses in the sense that conditions under which these hypotheses are supposed to hold are indicated. In chapter 4 we described this theory and reviewed literature that has dealt with each of the mechanisms along the lines of our theory.

The theory of social capital views social networks as social resources. People have access to social resources as well as to economic, cultural and other resources. Social resources come within reach through members of the person's social network (Lin 1982). In order to achieve all kinds of goals (for instance, health) people can use their resources. People who have access to more resources, including social resources, are better able to achieve their goals. People obtain social resources by investing in social relations: people have to make an effort to maintain or expand their relations. But access to social resources does not imply that they are used. Social capital is the result of a) the number of people available; b) the resources that can be mobilized via these persons; and c) the extent in which these persons are willing or committed to provide resources (Flap 1988).

Effects of social networks on health are usually conceived of in terms of one of two central hypotheses: 1) "buffer" effects: social support leads to improved health through stress-buffering; and 2) "direct" effects: more integration leads to greater health irrespective of the level of stress. In general, social integration is expected to enhance health. A mechanism possibly involved in this relationship is social regulation. We hypothesized that the so-called "direct" effect of the social network on health is to be explained by social regulation of health behaviour. When people have invested more in their social network, they will behave more according to the norms prevailing in this network. Network characteristics as peer behaviour, marital and parental status are shown to be positively related to health behaviour in the literature. Whether this also explains the "direct" effect of social networks on health has not been studied properly until now.

The "buffer" effect of social support is specified with the help of the theory of social capital in terms of matching events and support and of actual use of support. According to this theory, people may mobilize their social resources to achieve goals. If their well-being is threatened by stressful events, they can reduce the consequences by resorting to their social resources. We argued that these buffer effects of social support can only take place when events to be buffered are present. This means that the often observed interaction of support and events is not incorporated here. Finding a buffer effect through this interaction effect indicates that people experiencing more events ànd more support suffer fewer consequences than people experiencing fewer or no events at all òr less or no support at all. But we are not interested in the case of no or less events, because then there is nothing to buffer. A further refinement of the buffer hypothesis concerns the definition of social support: resources, like support, must be available ànd mobilized before the buffer effect can take place. This refinement limited the literature to be reviewed to those studies concerning behavioural support, because only this type of support refers to concrete situations and not to general expectations. Since social resources are often goal-specific, it is possible that the support available is of no use in the situation at hand: the type of support and of the event have to match. Matching has not been studied much yet. Two studies were found which show that types of support differ in adequacy in different situations. A few other studies are less clear about the usefulness of matching, but their measures of support and events were not very good.

The third mechanism we specified with the help of the theory of social capital is selection in the social network through illness or impairments. Limitations in functioning restrict the opportunities to share activities and to invest in social relations. We hypothesize that the social network will deteriorate the longer the illness lasts. The remaining part of the network will be a dense core consisting of long-standing, multiplex relations with people who have more time available and live nearby. Studies we reviewed showed that the social network is influenced negatively by illness or impairment. What social relations are particularly vulnerable to this process and why, has not been under extensive study.

We concluded that the literature has provided us with some indications for the usefulness of the mechanisms we described. But more research needs to be done before we can become more conclusive. In chapters 5 to 7 we investigated each of the proposed mechanisms with our data.

The mechanism of social regulation studied empirically

In chapter 5 we investigated the mechanism of social regulation empirically. We argued that the so-called "direct" effect of the social network on health may be explained by social regulation of health behaviour. We hypothesized that if norms prevailing in a social network are health-promoting and if the network is dense or homogeneous, then a person in this network will be in better health because people in dense or homogeneous networks will conform to the norms that prevail within the network strongly. Religious affiliation and professionals in health care were expected to be sources of health-promoting norms. For people under stress, possible relationships between characteristics of the social network and health can be attributed to circumstances of stress as well as to general circumstances. Therefore, we argued that when effects of social networks on health are studied for people under any level of stress, "buffer" and "direct" effects can not be disentangled. And because we investigated a possible mechanism of "direct" effects here, we selected respondents not under stress.

Analyses showed that religious affiliation was related to less smoking and less drinking, while having social contacts with professionals in health care was related to being in the right weight and participating in sports more often. We expected that, if sources of health-promoting norms are present in a network and the network is dense or homogeneous, then the effect of these network characteristics would disappear when health behaviour was taken into account. Whether we took health behaviour into account or not, the combinations of religious affiliation and density or homogeneity of the social network appeared to be related to health in the same way. The same is true for the combinations of the presence of health care professionals in the network and the density or homogeneity. We therefore concluded that the effect of social regulation on health could not be demonstrated. However, the first part of this explanation is corroborated: health behaviour was related to characteristics of the networks of which people were part of.

Matching types of events and types of support: does support buffer?

In chapter 6 we tested the hypothesis on buffer effects. We selected respondents under specific kinds of stress, because stress has to be present to make buffering possible. Further, we asked the respondents which types of support they actually received in a given period, since we assumed that it is the mobilization of support that buffers, not some general expectation regarding the receipt of support in times of stress. We hypothesized that specific types of resources are more relevant to the consequences of some events than of others. We tested this hypothesis in two ways: 1) by taking life events as stressor and occurrence of illness as outcome, and, which is somewhat unusual, 2) by taking illness as stressor and duration and disabilities of illness as the outcome. Life events and illness as stressors were categorized according to expected need for each specific kind of support.

Only the availability of health-related information (measured by having social contacts with health professionals, thus not by actual receipt of this kind of support) appeared to be negatively related to occurrence of illness, indicating a buffer effect. All other relationships between types of support and illness revealed that people who were under stress and did receive more support, also report more illness.

For the analyses on illness as a stressor, the similar results were found. Again, health-related information buffers illness, but only for the number of disabilities. All other types of support were positively related to duration of illness and disabilities, indicating that people who were ill longer and experienced more disabilities received more support. This clearly shows that people mobilize support in times of stress. We probably did not find effects of buffering because our design was cross-sectional, and a buffer effect may show up after our study was conducted. Another reason for not finding buffer effects may be that the people we studied differed too much in severity of illness since we found that those who were ill for a longer period and more disabled also reveiced more (health-related) support. Analyses for people who reported at least one day of suffering the consequences of their illness and for those with at least one disability showed some more evidence of the expected buffer effects of social support. But still, the evidence is meagre. Only one type of support, health-related information, appeared to be consequently related to consequences of illness. And this measurement of support did not concern the actual receipt of support, but merely the availability of social contacts with health professionals. We concluded therefore that it is very likely that it is not support which influences health but social integration in general. And social integration is expected to work irrespective of stress level. Chapter 3 showed that other measures of integration, especially household composition, are positively related to health for all respondents. Analyses on a selection of people experiencing chronic diseases indicated that living together with others, being member of a church, being member of a voluntary organization, having more friends and a higher number of support-givers, is associated with reporting less disabilities. The causal direction of these results has to be determined in longitudinal analyses, because it is possible that integration protects health, but it is also possible that it is health that determines social integration.

Selection in the network through duration of disease

Chapter 7 dealt with the consequences of disease for social networks. We hypothesized, in terms of the theory of social capital, that networks of the chronically ill are negatively affected by the duration of a disease, and even more so when the disease is more "socially" severe (indicated by visibility, threatening nature to others, and functional disablement). We expected that the duration of the disease will affect the social network in such a way that the proportion of women, kin, long-standing relations, and people living nearby are higher for people suffering from a disease longer. These types of relations are supposed to be multiplex, or based on consensus, or these types of people are supposed to be more ready and available to give support. Contacts with colleagues (most often uniplex relations), friends, support-givers, and membership of organizations, would be affected by the duration of disease negatively. Characteristics as gender, education, degree or urbanization, and life-cycle stage were taken into account in all analyses, because we expected these characteristics to influence the social networks of the chronically ill in a similar way as they influence people who are not chronically ill.

Our analyses showed that, in general, duration of disease does not affect the network strongly. We found statistically significant relationships in line with our expectations only for socially moderate and severe diseases. The number of friends and the number of support-givers were smaller for people suffering longer from socially severe chronic diseases. For moderate chronic diseases we found that chances of having work outside the house were lower for people suffering longer from these diseases. Results on socially mild chronic diseases showed that people who were ill longer appeared to have more friends, and fewer women in their network.

8.3. Theoretical and methodological considerations

During our study, we faced several theoretical and methodological difficulties. Here we describe some of the more general theoretical problems together with the accompanying methodological obstacles. For a more detailed discussion, we refer to the earlier chapters.

With the help of the theory of social capital it was possible to specify three mechanisms in the relationship between social networks and health: effects of social networks on health through social regulation of health behaviour, effects of social networks on health through stress-buffering social support, and effects of health status on social networks through selection. The use of just one theory to specify three different mechanisms is new, as well as the specific description of each mechanism. In fact, very few researchers on this subject use a (sociological) theory to derive hypotheses from. Mechanisms behind relationships between social networks and health are not very often discussed or investigated.

"Direct" effects of social networks on health, we hypothesized, are due to social regulation of health behaviour. Although other researchers already investigated the influence of personal relations on health behaviour (e.g., Umberson 1987), none thus far studied the effects of health-related norms and density of the social network on health. The empirical test of this hypothesis (chapter 5) revealed that the social network was related to health whether we took health behaviour into account or not. So, these results do not support our explanation of "direct" effects. But the health behaviour of the focal person was clearly related to our measures of health-related norms in the network.

"Buffer" effects of social support were specified in the terms of the theory of social capital which refer to actual use of resources. We hypothesized that social support has to be received to make a buffer effect possible, in contradistinction to the vague notion of experience of support many other researchers use (see chapter 4 and 6). The receipt of specific types of support as a reaction to certain life events, for instance, is hypothesized to buffer possible consequences of these events. We called this "matching": types of support and types of stress have to match for the buffer effect to take place. This may explain why studies using measures of integration do not and studies using measures of support do find effects of buffering: types of stress and of support have to match. Measures of integration do not indicate the amount or type of support exchanged, they indicate only the existence of particular social relations. Our analyses showed that people suffering from more consequences of stress, also received more support. Schwarzer and Leppin (1991) call this phenomenon a "mobilization" effect: stress can bring about increased support that could mistakenly be viewed as a negative buffering effect even in longitudinal studies. Since "mobilization" could be caused by the fact that people who are more severely ill also need more support than those less severely ill, we may, in our analyses, not have been able to take the severity of the complaints sufficiently into account. People suffering from illness to the same severity should be compared. Stress-buffering effects of support were not apparent in our study, with the exception of one type of support. The availability of health-related information (indicated by having social contacts with health professionals) appeared to buffer illness in terms of a shorter duration and less disabilities. Since this measure of support does not refer to actual use, we are left with doubts about the interpretation of our results and the usefulness of our theory and data in this respect. An important implication of the argument just given might be that the mechanism of buffer effects in terms of actual use of resources does not hold. Since health-related information is measured as access to health professionals, this could merely reflect the availability of social support, irrespective of its actual utilization. Stated this way, this measure comes very close to another way of indicating social integration. Analyses shown in chapter 3 indicate that other measures of integration, especially household composition, are positively related to health. And analyses shown in chapter 5 showed that social regulation was not the key factor in explaining why measures of social integration affect health.

Another mechanism, suggested in the literature, is that integration might lead to psycho-physiological changes (like elevated bloodpressure), which influence disease susceptibility. Less exposure to social contacts then, is expected to produce a worse physiological or psychological status that in its turn could lead to health complaints (Berkman 1987). This possible mechanism is expected to work irrespective of stress level. Our analyses underline that the causal direction of these results has to be determined by longitudinal analyses, because it is possible that integration protects health, but it is also possible that it is health that determines the degree of social integration.

The reverse mechanism, the effects of health status on social networks, appeared to be a whole different area in the literature, although we argued that this mechanism can be described with the help of the theory of social capital too. Janssen (1992) already described why social relations will be affected by health status. We elaborated on her work by describing what social relations are particularly vulnerable to the process of selection in the network through a chronic disease. We also introduced the concept of "social" severity of chronic diseases to indicate which diseases were more likely to influence the social network. In chapter 7 we showed results of testing these hypotheses. The cross-sectional nature of our data seemed problematic for our analyses at first. Since we were interested in effects of suffering from a disease on the social network, we would have preferred to analyze characteristics of social networks and the course of illness for people, from before disease onset over a longer period of time. These data, of course, are very hard and expensive to gather. An option we considered thoroughly was to compare social networks of people suffering from chronic diseases with the social networks of healthy people. Because these two groups might have had different social networks before disease onset, one cannot establish effects of the chronic disease on the social network in this way. We therefore decided to investigate the effects of duration of the disease on the social network. We took several factors in account, to be able to control for possible differences in social networks not due to the duration of a chronic disease, like, for instance, life cycle stage (a combined measure of age, partner status, and having children). Although our data did not reveal many statistical significant relationships, we concluded that socially moderate and severe diseases appeared to have some deteriorating influence on the social network, indicated by less friends and support-givers, and by less involvement in work outside the house, reported by persons who were ill longer. Socially mild diseases did not deteriorate the network.

As can be learned from the above descriptions, major methodological problems in this study were the cross-sectional nature of the data, and the lack of certain data on network-members (e.g., the health-related norms of the network-members, in chapter 5). The cross-sectional nature of the data was a serious problem in the analyses on buffer effects. What we found in these analyses was a mobilization of support: people suffering from more consequences of stress also received more support. We could not determine buffer effects in the sense that among the people under stress, those who received more support suffered less consequences. This may be a problem of time, because we only had cross-sectional data available and could not wait long enough for the buffer effect to appear. On the basis of our results, shown in chapters 6 and 7, we conclude that effects of social networks on health or vice versa probably arise only for severe diseases or events. It may be very hard to find such effects in an open population as ours. Therefore, we conclude that it seems necessary to select the respondents strictly in terms of severity of specific events or diseases.

These methodological shortcomings may explain why we did not find much support for our hypotheses. But our study also had some important methodological merits when compared with other studies published. Since we had a diverse set of data available, we were able to test three different mechanisms. We used several indicators of health, of which some are more objective than others. And we had three types of indicators of the social network at our disposal. But the major advantage of this study is the large number of respondents which is representative of the Dutch population. Hence, our findings cannot be simply dismissed. One of the consequences of explicitly formulating and testing hypotheses as we did, is that it may be that these hypotheses are refuted.

Admitting that an even stronger research design might reveal more confirming evidence, we would like to discuss a substantial issue concerning our theoretical approach. The ideas about the mechanisms behind the relationship between social networks and health have been developed from a sociological theory. We did not incorporate psychological or psycho-physiological mechanisms in our theory. The theory that has been developed is incomplete in the sense that we are aware that there will be large differences in the interpersonal content of relations. There is a difference in the point of departure of sociologists and psychologists studying the relationships between social networks and health. As psychologists are mainly interested in individuals' actions and perceptions, sociologists are more concerned with the structural arrangements in which individuals are embedded. These arrangements, as in our study, social networks, are assumed to influence health through social regulation and social support. And the reverse relationship of health with social networks is assumed to be effective through social selection. Pearlin (1989, p. 250) argues that coping and maybe also self-esteem, mastery and personality are also of sociological interest. Important elements of coping, for instance, may be learned from one's membership and reference groups in the same ways as other behaviours are learned and internalized. We suggest that it may very well be that people with equal social network characteristics, have different types of coping styles. Whether sociological or not, for a full understanding it seems worthwhile to include these kinds of factors in models on the relationships between social networks and health, since our data do not provide overwhelming confirmatory evidence for the relationships between social networks and health as we specified them.

Recently, Cohen (1988), and elaborating on his study also Schwarzer and Leppin (1991), have proposed models on the relationships between social networks and health in which sociological and psychological mechanisms are integrated. These models start from the differentiation of types of social support. Starting from the work of House, Umberson and Landis (1988), Schwarzer and Leppin (1991) focus on the content of relations as the key factor in the relationships between social networks and health. The other aspects of social networks, social integration and structure, are assumed to influence the perceived or received contents. These contents of social relations are divided in information, identity and self-esteem, social influence, and tangible resources (Cohen 1988). In this way, two of the mechanisms we dealt with (social regulation, or influence, and social support like tangible resources and information), are incorporated with a more psychological mechanism of identity and self-esteem. Schwarzer and Leppin (1991) point to the distinction between "cognitive" (or perceived) and "behavioural" (or received) social support. Their model of social support allows for direct as well as buffer effects of social support. These authors do not specify the mechanism of social regulation as a possible direct path (whereas Cohen specifically did), nor do they specify the reverse relationship of effects of health status on social network characteristics. Cohen did not incorporate effects of health status on social networks either, since he was interested in the etiology of disease.

Future research, we feel, would gain from a fusion of the theory of social capital and the models as proposed by Cohen (1988) and Schwarzer and Leppin (1991). By taking factors in as coping, identity and self-esteem, and perception of support in the specification of mechanisms by the theory of social capital, the mechanisms of direct, buffer and selection effects can become more specified and better tested. Future longitudinal research based on this new theoretical model and gaining from our and others' insights may very well find serious effects of social networks on health and vice versa. However, serious theoretical work has to be done, because merely adding a number of psychological variables in the empirical analysis is not identical to theoretical integration.

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Samenvatting en conclusies

In dit boek staan de verbanden tussen sociale netwerken en gezondheid centraal. Onder sociale netwerken verstaan we hier alle relaties die een persoon heeft met andere personen (ego-gecentreerde of persoonlijke sociale netwerken). Er zijn twee belangrijke redenen te noemen voor dit onderzoek. Ten eerste bestond er binnen de Nederlandse onderzoeksliteratuur een tekort aan representatieve gegevens over sociale netwerken en gezondheid. Ten tweede was er een gemis aan een omvattend theoretisch idee dat verschillende soorten verbanden tussen sociale netwerken en gezondheid zou kunnen verklaren. Met dit boek is geprobeerd beide tekortkomingen te verhelpen en is bovendien een aantal hypothesen getoetst die voortvloeien uit de theorie die in dit boek is ontwikkeld.

Dit boek begint na een korte inleiding (hoofdstuk 1) met een onderzoek naar de sociale netwerken van Nederlanders (hoofdstuk 2). In hoofdstuk 3 worden de verbanden tussen netwerken en gezondheid behandeld. In hoofdstuk 4 worden mogelijke mechanismen in de relatie tussen sociale netwerken en gezondheid gespecificeerd met behulp van de theorie van het sociale kapitaal en worden eerder gepubliceerde relevante onderzoeken besproken. In de hoofdstukken 5 tot en met 7 worden resultaten gegeven van empirisch onderzoek naar deze mechanismen. In hoofdstuk 5 worden verbanden tussen kenmerken van sociale regulatie en gezondheid getoond. Onderzoek naar veronderstelde "buffer-" effecten van verschillende typen steun op de gevolgen van verschillende soorten stress wordt getoond in hoofdstuk 6. Hoofdstuk 7, tenslotte, handelt over de effecten van de duur van een ziekte op de samenstelling van het sociale netwerk. In de onderstaande paragrafen worden de resultaten per hoofdstuk in meer detail beschreven, worden conclusies getrokken over de waarde en sterkte van onze theoretische verklaringen, en worden theoretische en methodologische problemen besproken die we bij de uitvoering van dit project tegen zijn gekomen.

Samenvatting

Sociale netwerken van de Nederlanders

Voordat deze studie van start ging, was het onderzoek in Nederland naar sociale netwerken gericht op specifieke problemen van bepaalde groepen personen, zoals bijvoorbeeld personen die aan een bepaalde ziekte lijden. Tijdens onze studie publiceerden Felling, Fiselier en Van der Poel (1992) hun representatieve onderzoek naar het geven en ontvangen van sociale steun. Wij beschrijven in dit boek de sociale netwerken van Nederlanders in termen van alle drie de benaderingen die gangbaar zijn in netwerk onderzoek. Deze benaderingen zijn elk gericht op andere kenmerken van sociale netwerken. De sociale integratie benadering beperkt zich tot het vaststellen van de aan- of afwezigheid van bepaalde soorten sociale relaties. Onderzoekers die gebruik maken van de sociale steun benadering zien de kwaliteit van sociale relaties als het belangrijkste netwerk-aspect, dat zou kunnen worden afgelezen aan het geven en ontvangen van sociale steun. De sociaal netwerk- of structuur benadering richt zich op structurele kenmerken van de netwerken van respondenten (bijvoorbeeld de dichtheid, of de heterogeniteit).

De gegevens waarop alle analyses in dit boek zijn gebaseerd werden verzameld als onderdeel van de "Nationale Studie naar Ziekten en Verrichtingen in de Huisartspraktijk". De gegevens die wij hier gebruiken zijn verzameld door middel van gezondheidsinterviews (Foets, Van der Velden en De Bakker 1992). Een aantal vragen in dit interview betreffen de gezondheidsstatus en de sociale netwerken van respondenten. De steekproef is a-select getrokken uit de administratie van 161 deelnemende huisartsen. De totale omvang van de steekproef besloeg 17,047 respondenten; daarvan was 76.6 % bereid deel te nemen aan het onderzoek. De steekproef kan als representatief worden beschouwd voor de Nederlandse bevolking omdat bijna alle inwoners van Nederland staan ingeschreven bij een huisarts. Bovendien bleek onze steekproef niet van de totale Nederlandse populatie af te wijken wat de verdeling naar geslacht, leeftijd en burgerlijke staat betreft (Foets en Van der Velden 1990). We hebben hier alleen resultaten gepresenteerd voor respondenten van 18 jaar en ouder (N=10.110), omdat kan worden verondersteld dat deze groep meer autonoom beslissingen kan nemen over de samenstelling van zijn eigen netwerk dan de groep van jongere respondenten. Wij hebben gegevens beschikbaar over elk van de drie benaderingen in netwerk onderzoek: de benadering van sociale integratie/isolatie, de sociale steun benadering, en de sociaal netwerk- of structuur benadering (House en Kahn 1985, Dykstra 1990).

Sociale integratie wordt in ons onderzoek vastgesteld aan de hand van de samenstelling en de grootte van het huishouden, het lidmaatschap van verenigingen, het lidmaatschap van een religieuze groepering en de frequentie van bezoek daaraan, het aantal "echte" vrienden, en het aantal steun-gevers. Een meerderheid van de Nederlanders (85 %) woont samen met een of meer anderen, 60 % is lid van minstens een vereniging en ongeveer 25 % blijkt regelmatig een kerk te bezoeken. Bijna 60 % van alle Nederlanders in betrokken bij activiteiten buiten het huishouden. De Nederlander zegt gemiddeld 6 "echte" vrienden te hebben. Het aantal steun-gevers is afgeleid uit vragen over gebieden waarop behoefte aan steun zou kunnen hebben bestaan. Deze vragen werden gesteld in het kader van de sociale steun benadering.

Om sociale steun te meten is de respondenten gevraagd een aantal namen te noemen van personen die hen steun hebben gegeven. Er zijn 6 namen-genererende vragen gesteld. Deze vragen betreffen levensgebieden waarop behoefte aan steun zou kunnen hebben bestaan in de laatste maanden voor het interview. Maximaal konden 6 namen worden genoemd van personen waarvan steun is ontvangen. De respondenten noemen gemiddeld 4 namen. Wanneer we naar de specifieke gebieden kijken waarop namen konden worden genoemd, dan blijkt dat bijna alle Nederlanders namen noemen van mensen die bij hen op bezoek zijn gekomen of waar zij op bezoek zijn geweest in de laatste maand voor het interview. Zeer weinig respondenten blijken in staat namen te noemen naar aanleiding van de vraag naar steun bij ziekte in de afgelopen maand. Waarschijnlijk zijn veel mensen niet ziek geweest in die maand en is deze vraag daarom niet voor hen van toepassing.

Om de structuur van netwerken vast te stellen berekenden we de proportie familieleden en de heterogeniteit in het steun-gevende netwerk naar geslacht en arbeidsmarktdeelname. Onze resultaten tonen aan dat het percentage familieleden in dit netwerk gemiddeld 41 % is en dat de netwerken nogal homogeen zijn wat betreft de verdeling naar geslacht en arbeidsmarktdeelname.

Om onze resultaten met die van anderen te kunnen vergelijken beschreven we de kenmerken van sociale netwerken ook in relatie tot het geslacht, de leeftijd, de opleiding en de urbanisatiegraad van de woonplaats van de respondenten. Deze kenmerken blijken vrijwel altijd gerelateerd te zijn aan kenmerken van sociale netwerken, met name opleiding en urbanisatiegraad. Bijvoorbeeld, hoger opgeleide personen blijken vaker lid te zijn van verenigingen, maar minder vaak van een religieuze groep dan lager opgeleiden. Hoger opgeleiden noemen meer mensen die hen steun geven, maar zij rapporteerden minder vaak familieleden als steun-gevers dan lager opgeleiden. Mensen die wonen in grote steden blijken minder vaak lid te zijn van een vereniging of religieuze groep, maar noemen daarentegen meer mensen die hen steun gaven, dan mensen woonachtig op het platteland. Mensen die in grote steden wonen rapporteren ook minder familieleden als steun-gevers en minder "echte" vrienden dan mensen die op het platteland wonen.

Belangrijk voor onderzoek naar sociale netwerken is de omvang van de ontbrekende gegevens, met name omdat gegevens over zwakkere sociale relaties eerder zullen ontbreken dan gegevens over zeer sterke sociale relaties (Burt 1987). Onze gegevens tonen aan dat netwerkleden waarvoor de respondent niet alle gevraagde gegevens heeft verstrekt minder vaak contact hebben met de respondent. Vrouwen, ouderen, en mensen die in grote steden wonen verstrekten vaker niet alle gegevens over hun netwerkleden dan mannen, jongeren en mensen die in kleinere steden of op het platteland. Het gevaar van vertekening door ontbrekende gegevens valt voor ons onderzoek echter mee. Bijna 90 % van de respondenten verstrekten wel alle informatie over hun netwerkleden. We concluderen daarom dat het probleem van ontbrekende gegevens in ons onderzoek niet groot is.

Kenmerken van sociale netwerken en gezondheid

Als een logisch vervolg op deze beschrijving van kenmerken van het sociale netwerk worden de verbanden tussen netwerken en gezondheid onderzocht. In de afgelopen 20 jaar is onderzoek uitgevoerd naar de invloed van het sociale netwerk op diverse aspecten van de gezondheid. De verbazingwekkende resultaten van Berkman en Syme (1979) vormen een mijlpaal in de onderzoeksliteratuur. "Ever since Lisa Berkman and Leonard Syme reported that people in Alameda County, California, who had a lot of friends and relatives and saw a lot of them were likely to live longer than those who seldom visited with friends and relatives, medical sociologists have felt an important connection has been established between social behaviour and health status" (Elinson 1985). Wanneer niet sterfte het onderwerp van onderzoek is, maar ziekte, dan zijn de resultaten minder helder. In Nederland is dit onderzoek tot nu toe beperkt gebleven tot specifieke groepen patiënten.

In hoofdstuk 3 onderzoeken we de verbanden tussen sociale netwerken en gezondheid voor de representatieve steekproef uit de Nederlandse bevolking. De indicatoren van drie typen kenmerken van sociale netwerken (integratie, steun, en structuur) zijn gerelateerd aan de rapportage van chronische aandoeningen, acute klachten, psychiatrische klachten en subjectief ervaren gezondheid. Omdat we willen weten of de verbanden tussen sociale netwerken en gezondheid worden beïnvloed door belangrijke determinanten (namelijk geslacht, leeftijd, en opleiding) van zowel gezondheid als sociale netwerken is met deze determinanten in de analyses rekening gehouden.

Logistische regressie-analyses tonen aan dat kenmerken van sociale integratie, zoals de samenstelling en grootte van het huishouden, het aantal "echte" vrienden, een actief lidmaatschap van een religieuze groep en lidmaatschap van een of meer verenigingen, positief samenhangen met de gezondheid, ook wanneer rekening wordt gehouden met geslacht, leeftijd en opleiding. Dit is niet het geval wanneer gezondheid afgelezen wordt aan het al of niet lijden aan een chronische aandoening: nadat rekening wordt gehouden met geslacht, leeftijd en opleiding, zijn kenmerken van sociale integratie niet langer gerelateerd aan het voorkomen van chronische aandoeningen. Het aantal steun-gevers als kenmerk van integratie vertoont onverwachte verbanden met gezondheid: mensen met meer steun-gevers rapporteren ook meer gezondheidsklachten. Kenmerken van de structuur van sociale netwerken, zoals bijvoorbeeld de proportie familieleden, de proportie langdurige relaties, en de heterogeniteit in het netwerk naar geslacht en arbeidsmarktdeelname, zijn vrijwel nooit gerelateerd aan gezondheid wanneer met de eerder genoemde determinanten wordt rekening gehouden. Het ontvangen van verschillende soorten steun is negatief gerelateerd aan gezondheid: mensen die steun krijgen rapporteren ook meer aandoeningen en gezondheidsklachten. Geslacht, leeftijd, en opleiding blijken in een aantal gevallen invloed te hebben op de relaties tussen kenmerken van sociale netwerken en gezondheid, in die zin dat verbanden verdwijnen wanneer rekening wordt gehouden met deze determinanten. Dit geldt echter niet voor alle soorten kenmerken van sociale netwerken even sterk.

Mechanismen in de relatie tussen sociale netwerken en gezondheid

De vraag waarom sociale netwerken en gezondheid aan elkaar zijn gerelateerd is tot nu toe in de onderzoeksliteratuur grotendeels onbeantwoord gebleven. Verschillende mechanismen zijn wel gesuggereerd maar deze zijn niet empirisch en systematisch onderzocht. Wij stellen dat twee gedragsmechanismen (sociale regulatie en het geven van steun wanneer dat nodig is) samen met een omgekeerd mechanisme (de gezondheidsstatus beïnvloedt het sociale netwerk) beschreven kunnen worden in termen van de theorie van het sociale kapitaal. Met behulp van deze theorie geven we niet alleen een beschrijving van de mechanismen, maar blijkt het ook mogelijk bestaande hypothesen te specificeren in die zin dat wordt aangegeven onder welke condities de hypothesen opgaan. In hoofdstuk 4 beschrijven we de theorie en bespreken we de literatuur die handelt over de mechanismen zoals die zijn gespecificeerd volgens onze theorie.

Volgens de theorie van het sociale kapitaal kunnen sociale netwerken worden beschouwd als sociale hulpbronnen. Mensen hebben toegang tot zowel sociale hulpbronnen als tot economische, culturele en andere hulpbronnen. Sociale hulpbronnen komen binnen bereik via de netwerkleden van een persoon (Lin 1982). Om allerlei doelen te kunnen bereiken (bijvoorbeeld gezondheid) kunnen mensen deze hulpbronnen gebruiken. Mensen die beschikken over meer hulpbronnen, waaronder ook sociale hulpbronnen, zijn beter in staat hun doelen te bereiken. Sociale hulpbronnen zijn te verkrijgen door investeringen in sociale relaties: mensen moeten moeite doen om hun sociale relaties te onderhouden of uit te breiden. Toegang tot sociale hulpbronnen betekent echter nog niet dat deze ook gebruikt kunnen of zullen worden. Sociaal kapitaal is namelijk het resultaat van a) het aantal mensen dat voor hulp beschikbaar is, b) de hulpbronnen die kunnen worden gemobiliseerd via deze personen, en c) de mate waarin deze personen bereid of verplicht zijn hulp te leveren (Flap 1988).

Effecten van sociale netwerken op de gezondheid worden meestal beschreven in termen van een van de twee volgende hypothesen: 1)"buffer-" effecten: sociale steun leidt tot een betere gezondheid door het bufferen van stress; en 2) "directe" effecten: meer integratie leidt tot een betere gezondheid ongeacht het niveau van stress. In het algemeen wordt integratie geacht de gezondheid positief te beïnvloeden. Een mogelijk mechanisme in deze relatie is sociale regulatie. Wij veronderstellen dat het zogenaamde "directe" effect van sociale netwerken op gezondheid kan worden verklaard door de sociale regulatie van gezondheidsgedrag. Wanneer mensen meer hebben geïnvesteerd in sociale relaties, dan zullen zij zich meer gedragen volgens de normen die in deze netwerken gelden. Netwerkkenmerken zoals gedrag van netwerkleden, en het hebben van een partner of kinderen, blijken volgens de literatuur gerelateerd te zijn aan het gezondheidsgedrag van een persoon. Of dit ook het "directe" effect van sociale netwerken op gezondheid verklaart, is tot nu toe niet voldoende onderzocht.

Het "buffer-" effect van sociale steun is gespecificeerd met behulp van de theorie van het sociale kapitaal in termen van de aansluiting ("match") tussen gebeurtenissen en steun, en van het daadwerkelijke gebruik van steun. Volgens deze theorie kunnen mensen hun sociale hulpbronnen mobiliseren om bepaalde doelen te bereiken. Wanneer hun welzijn wordt bedreigd door stressvolle gebeurtenissen, kunnen de gevolgen van deze gebeurtenissen worden beperkt door een beroep te doen op de sociale hulpbronnen. Wij stellen dat deze "buffer-" effecten van sociale steun alleen kunnen optreden wanneer er ook daadwerkelijk gebeurtenissen hebben plaats gevonden. Dit betekent dat het veelvuldig onderzochte interactie-effect tussen steun en gebeurtenissen door ons niet wordt onderzocht. Wanneer een "buffer-" effect wordt vastgesteld via deze interactie betekent dit dat mensen die meer gebeurtenissen hebben meegemaakt en die meer steun hebben ontvangen, minder gevolgen van deze gebeurtenissen ondervinden dan mensen die geen of weinig gebeurtenissen hebben meegemaakt en geen of weinig steun daarbij hebben ontvangen. Wij zijn echter niet geïnteresseerd in die gevallen waar geen of weinig gebeurtenissen hebben plaats gevonden, want dan valt er ook niets te bufferen. Een volgende verfijning van de "buffer-" hypothese betreft de definitie van sociale steun: hulpbronnen, zoals sociale steun, moeten beschikbaar zijn èn ook worden gebruikt, wil er sprake zijn van een "buffer-" effect. Dit betekent dat we alleen nog zijn geïnteresseerd in gedragssteun, die wordt betrokken op specifieke situaties, en niet in algemene verwachtingen van steun. Door deze verfijning werd de te bespreken literatuur aanzienlijk beperkt omdat veel studies juist deze algemene verwachtingen van steun onderzoeken. Omdat sociale hulpbronnen vaak doel-specifiek zijn (mensen die slecht ter been zijn kun je niet vragen te helpen met zware spullen te verhuizen), is het mogelijk dat de steun die beschikbaar is niet van pas komt in de specifieke situatie die zich op een bepaald moment voordoet: het type steun en de gebeurtenis moeten op elkaar aansluiten, dus "matchen". Dit matchen is nog niet veel onderzocht. Wij hebben twee studies gevonden die aantoonden dat verschillende typen steun ook verschillen naar adequaatheid in verschillende situaties. Een klein aantal andere studies was minder eenduidig over het nut van matching, maar de meetinstrumenten voor sociale steun en gebeurtenissen die in deze studies werden gebruikt zijn niet erg adequaat.

Het derde mechanisme dat is gespecificeerd met behulp van de theorie van het sociale kapitaal is selectie in het sociale netwerk door ziekte of beperkingen in het lichamelijk functioneren. Door deze beperkingen worden de mogelijkheden om deel te nemen aan gezamenlijke activiteiten en te investeren in sociale relaties ook beperkt. We stellen dat het sociale netwerk meer zal afnemen, zowel in grootte, in functie als in samenstelling, naarmate een ziekte of beperking langer duurt. Het sociale netwerk dat over blijft zal meer en meer gaan bestaan uit een hechte kern van langdurige, multiplexe sociale relaties, van sociale relaties die zelf meer tijd beschikbaar hebben en dichtbij wonen. De literatuur op dit gebied toont aan dat het sociale netwerk inderdaad negatief wordt beïnvloed door ziekte of beperkingen. Welke sociale relaties met name gevoelig zijn voor dit proces en waarom is nog niet uitgebreid onderzocht.

We concluderen dat in de literatuur enkele studies zijn te vinden die aangeven dat de manier waarop wij de mechanismen hebben gespecificeerd een goede is. Maar er is duidelijk nog veel meer onderzoek nodig voordat hier duidelijke conclusies over te trekken zijn. In de hoofdstukken 5 tot en met 7 hebben we de voorgestelde mechanismen onderzocht met behulp van de beschikbare gegevens.

Het mechanisme van sociale regulatie empirisch onderzocht

In hoofdstuk 5 is het mechanisme van sociale regulatie empirisch onderzocht. We stellen dat het zogenaamde "directe" effect van het sociale netwerk op de gezondheid kan worden verklaard door de sociale regulatie van gezondheidsgedrag. Onze hypothese is dat als de normen die in een netwerk gelden bevorderend zijn voor de gezondheid en als dit netwerk een dichte of homogene structuur heeft, dat dan een persoon in dit netwerk in betere gezondheid zal verkeren. We nemen daarbij aan dat mensen in dichte of homogene netwerken zich sterk aan de binnen hun netwerk geldende normen zullen conformeren. Een religieuze betrokkenheid en contacten met professionals in de gezondheidszorg werden verondersteld bronnen te zijn van gezondheidsbevorderende normen. Voor mensen die een bepaalde vorm van stress ondervinden kunnen mogelijke verbanden tussen kenmerken van sociale netwerken en gezondheid zowel worden toegeschreven aan de situatie van stress als aan algemene omstandigheden. We stellen dan ook dat wanneer effecten van sociale netwerken op gezondheid worden bestudeerd voor een groep mensen van wie een aantal wel en anderen geen stress ondervinden, "buffer-" en "directe" effecten niet goed van elkaar kunnen worden onderscheiden. Omdat in dit hoofdstuk "directe" effecten zijn bestudeerd is een groep mensen uit de steekproef geselecteerd die geen stress ondervindt.

De analyses tonen aan dat een religieuze betrokkenheid gerelateerd is aan minder roken en minder alcohol consumptie, terwijl sociale contacten met professionals in de gezondheidszorg gerelateerd blijken aan een gezond gewicht en meer sporten. We verwachten dat wanneer in het sociale netwerk normen worden gehanteerd die gezondheidsbevorderend zijn en dit netwerk zou dicht of homogeen zijn, effecten van sociale netwerken op de gezondheid zouden verdwijnen wanneer rekening zou worden gehouden met het gezondheidsgedrag van de betreffende persoon. Maar wat blijkt is dat combinaties van religieuze betrokkenheid en dichtheid of homogeniteit van het netwerk ook gerelateerd zijn aan de gezondheid nadat rekening wordt gehouden met gezondheidsgedrag. En dat zelfde geldt ook voor combinaties van het hebben van sociale contacten met professionals in de gezondheidszorg met dichtheid of homogeniteit van het sociale netwerk. Daarom concluderen we dat het effect van sociale regulatie op de gezondheid niet kan worden aangetoond. Wel wordt het eerste gedeelte van onze serie veronderstellingen bevestigd: het gezondheidsgedrag van personen is gerelateerd aan kenmerken van het sociale netwerk waar zij deel van uitmaken.

Het matchen van typen gebeurtenissen en typen steun: buffert steun?

In hoofdstuk 6 worden de hypothese over "buffer-" effecten getoetst. Daarvoor selecteerden we respondenten die onder stress staan, omdat stress aanwezig moet zijn om te kunnen worden gebufferd. We vroegen respondenten welke soorten steun zij hebben ontvangen in een bepaalde periode, omdat we veronderstellen dat alleen gemobiliseerde steun kan bufferen en niet een algemene verwachting van steun in tijden van stress. We stellen dat specifieke typen steun bij de ene soort stress meer van toepassing zullen zijn dan bij andere soorten. Deze hypothese is op twee manieren getoetst: 1) door uit te gaan van levensgebeurtenissen als stressoren en van ziekte als mogelijk gevolg van deze stress; en 2) door uit te gaan van ziekte als stressor en van duur en beperkingen bij ziekte als gevolg. De stressoren levensgebeurtenissen en ziekte zijn ingedeeld naar de verwachte behoefte daarbij aan specifieke soorten steun.

De eerste analyses betreffen de stressoren van levensgebeurtenissen. Alleen de beschikbaarheid van informatie over gezondheid (gemeten via het hebben van sociale contacten met professionals werkzaam in de gezondheidszorg) blijkt negatief gerelateerd te zijn aan het optreden van ziekte, wat een mogelijk "buffer-" effect zou kunnen betekenen. Alle andere verbanden tussen typen steun en ziekte tonen aan dat mensen die onder stress leven en meer steun ontvangen ook rapporteren zieker te zijn.

Voor de analyses van ziekte als stressor zijn identieke resultaten gevonden. Weer blijkt dat de indicator voor informatie over gezondheid in staat lijkt ziekte te bufferen, maar alleen voor het aantal beperkingen van ziekte. Alle andere typen steun zijn positief gerelateerd aan de duur van ziekte en het aantal beperkingen, wat betekent dat mensen die langer ziek zijn en meer beperkingen ervaren ook meer steun ontvangen. Dit toont duidelijk aan dat mensen in tijden van stress steun mobiliseren. Mogelijk vinden we geen "buffer-" effecten omdat we alle gegevens hebben verzameld op één moment in de tijd. Een "buffer-" effect kan zijn opgetreden nadat onze verzameling van gegevens was geëindigd. Een andere mogelijke reden voor het feit dat we geen "buffer-" effecten vinden zou kunnen zijn dat de mensen die wij hebben bestudeerd te veel verschillen in ernst van de ziekte. We vinden dat mensen die langer ziek waren en meer beperkt ook meer (gezondheidsspecifieke) steun ontvangen. Analyses voor mensen die op zijn minst één dag ziek waren of op zijn minst één beperking rapporteerden vertonen wat meer mogelijke "buffer-" effecten. Maar de resultaten blijven mager. Slechts één type steun, gezondheidsspecifieke informatie, blijkt consequent de voorspelde verbanden met de gevolgen van ziekte te vertonen. Echter, deze meting van steun betreft niet het daadwerkelijk ontvangen van steun, maar meer de beschikbaarheid van sociale contacten die deze steun zouden kunnen leveren. We concluderen daarom dat het zeer waarschijnlijk is dat het niet steun is dat de gezondheid beïnvloedt, maar sociale integratie in het algemeen. En sociale integratie wordt verondersteld de gezondheid te beïnvloeden ongeacht het niveau van stress dat wordt ervaren. In hoofdstuk 3 tonen we aan dat andere indicatoren voor sociale integratie, met name de samenstelling van het huishouden, positief verband houden met gezondheid voor alle respondenten. Analyses voor een selectie van chronisch zieke respondenten tonen aan dat het samenwonen met anderen, het lid zijn van een religieuze groepering, of van verenigingen, het hebben van meer vrienden en meer steun-gevers, alle verband houden met het rapporteren van minder beperkingen. Wat nu oorzaak is en wat gevolg in deze verbanden kan alleen worden aangetoond met behulp van longitudinaal onderzoek, omdat het mogelijk is dat door integratie de gezondheid wordt beschermd, maar evengoed dat de gezondheid bepaalt in hoeverre men sociaal is geïntegreerd.

Selectie in het netwerk door de duur van ziekte

Hoofdstuk 7 handelt over de gevolgen van ziekte voor het sociale netwerk. In termen van de theorie van het sociale kapitaal stellen we dat netwerken van chronische zieken negatief zullen worden beïnvloed door de duur van de ziekte, en nog meer wanneer de ziekte "sociaal" ernstiger is. De sociale ernst van een ziekte is afgeleid uit de zichtbaarheid van de ziekte, de mogelijke angst die een ziekte oproept bij anderen, en de beperkingen in het functioneren die een ziekte met zich meebrengt en waarvoor mogelijk een beroep op steun van anderen moet worden gedaan. We veronderstellen dat de duur van een ziekte het sociale netwerk zodanig zal beïnvloeden dat het percentage vrouwen, familie, langdurige sociale relaties, en mensen die dichtbij wonen hoger zal zijn voor mensen die langer aan een ziekte lijden. Deze soorten relaties zullen blijven bestaan vanwege het multiplexiteit karakter, of omdat ze gebaseerd zijn op consensus. Daarnaast is het ook mogelijk dat deze relaties blijven bestaan omdat hen meer middelen ter beschikking staan voor het geven van steun. Contacten met collega's (vaak uniplexe sociale relaties), met vrienden, of het aantal steun-gevers of lidmaatschap van organisaties, worden verondersteld negatief te worden beïnvloed door de duur van een ziekte. Met kenmerken van een persoon zoals geslacht, opleiding, urbanisatiegraad van zijn woonplaats en fase in de levenscyclus is in alle analyses rekening gehouden, omdat we verwachten dat deze kenmerken een zelfde invloed hebben op de sociale netwerken van chronisch zieken als op die van mensen die niet chronisch ziek zijn.

Onze analyses tonen aan dat, in het algemeen, de duur van een ziekte het sociale netwerk niet sterk beïnvloed. Duidelijke verbanden worden alleen gevonden voor sociaal ernstiger ziekten. Het aantal vrienden en het aantal steun-gevers blijkt kleiner voor mensen die langer lijden aan sociaal ernstige ziekten. Resultaten voor sociaal lichte ziekten tonen aan dat mensen die langer ziek zijn meer vrienden hebben, en minder vrouwen in hun netwerk dan mensen die korter aan deze ziekten lijden.

Theoretische en methodologische overwegingen

Tijdens de uitvoering van dit project hebben we met verschillen theoretische en methodologische problemen te maken gehad. Hier beschrijven we een aantal van de meer algemene theoretische problemen samen met de daarbij behorende methodologische kwesties. We verwijzen naar de vorige hoofdstukken voor een meer gedetailleerde discussie.

Met behulp van de theorie van het sociale kapitaal blijkt het mogelijk drie mechanismen in de relatie tussen sociale netwerken en gezondheid te specificeren: effecten van sociale netwerken op gezondheid door sociale regulatie van gezondheidsgedrag, effecten van sociale netwerken op gezondheid door de stress-buffering van sociale steun, en effecten van gezondheidsstatus op sociale netwerken via selectie. Het gebruik van slechts één theorie om drie verschillende mechanismen te specificeren is nieuw, en dat geldt ook voor elke aparte beschrijving van de mechanismen. Er zijn bovendien weinig onderzoekers op dit terrein te vinden die een (sociologische) theorie gebruiken om hypothesen af te leiden. Mechanismen achter de relatie tussen sociale netwerken en gezondheid zijn tot nu toe zelden besproken of onderzocht.

"Directe" effecten van sociale netwerken op gezondheid, zo nemen wij aan, worden veroorzaakt door sociale regulatie van gezondheidsgedrag. Alhoewel andere onderzoekers (o.a. Umberson 1987) de invloed van persoonlijke contacten op gezondheidsgedrag al hebben onderzocht, heeft geen van hen tot nu toe de effecten van normen over de gezondheid en de dichtheid van een sociaal netwerk op de gezondheid bestudeerd. De empirische toets van deze hypothese (hoofdstuk 5) toont aan dat kenmerken van het sociale netwerk zijn gerelateerd aan de gezondheid of nu wel of niet wordt rekening gehouden met gezondheidsgedrag. Deze resultaten ondersteunen onze verklaring van "directe" effecten dus niet. Wel bleek dat het gezondheidsgedrag van de persoon in kwestie duidelijk is gerelateerd aan indicatoren voor "gezonde" normen in het netwerk.

"Buffer-" effecten van sociale steun zijn gespecificeerd in termen van de theorie van het sociale kapitaal die verwijzen naar het daadwerkelijk gebruik van hulpbronnen. We veronderstellen dat sociale steun daadwerkelijk ontvangen moet worden wil het mogelijk zijn dat er een buffer-effect optreedt. Dit is in tegenstelling tot de vage notie van het "ervaren" van sociale steun die veel andere onderzoekers gebruiken (zie hoofdstuk 4 en 6). Het ontvangen van bepaalde soorten steun als reactie op bepaalde levensgebeurtenissen, bijvoorbeeld, wordt verondersteld de mogelijke gevolgen van deze gebeurtenissen te bufferen. We noemen dit "matching": de soort steun moeten bij de soort stress aansluiten om te kunnen bufferen. Deze redenering verklaart wellicht waarom onderzoeken die maten van integratie gebruiken vrijwel geen "buffer-" effecten vinden en onderzoeken die maten van steun gebruiken wel: de steun moet bij de stress aansluiten. Maten van integratie geven niet aan hoeveel steun of welke soort steun wordt gegeven, zij geven alleen aan of bepaalde soorten sociale relaties bestaan. Onze analyses tonen aan dat mensen die meer gevolgen van stress ondervinden, ook meer steun ontvangen. Schwarzer en Leppin (1991) noemen dit verschijnsel een "mobilisatie" effect: stress kan de steun doen toenemen wat foutief kan worden geïnterpreteerd als een negatief buffer-effect, zelfs in longitudinale studies. "Mobilisatie" kan zijn veroorzaakt door het feit dat mensen die ernstiger ziek zijn ook meer steun nodig hebben dan mensen die minder ernstig ziek zijn. In ons onderzoek zijn we er waarschijnlijk niet in geslaagd voldoende rekening te houden met de ernst van ziekten. Mensen die lijden aan ziekten die ongeveer even ernstig zijn zouden moeten worden vergeleken. Stress-bufferende effecten van sociale steun zijn uit ons onderzoek niet naar voren gekomen, met uitzondering van één soort steun. De beschikbaarheid van informatie over gezondheidsaspecten (afgelezen aan het hebben van sociale contacten met professionals in de gezondheidszorg) blijkt samen te hangen met een kortere duur en minder beperkingen bij ziekte. Omdat bij deze soort steun niet sprake is van daadwerkelijk gebruik, hebben we twijfels over de interpretatie van deze resultaten en het nut van onze theorie en gegevens hierover. Een belangrijke implicatie van het zojuist gegeven resultaat zou kunnen zijn dat het mechanisme van buffer-effecten in termen van daadwerkelijk gebruik van hulpbronnen niet zo werkt. Omdat informatie over gezondheidsaspecten gemeten is als toegang tot professionals in de gezondheidszorg, zou dit de beschikbaarheid van sociale steun kunnen aangeven, ongeacht of die steun ook wordt gebruikt. Zo gezien blijkt deze maat veel te lijken op maten van sociale integratie. Resultaten van analyses uit hoofdstuk 3, tonen aan dat andere maten van sociale integratie, met name de samenstelling van het huishouden, positief zijn gerelateerd aan de gezondheid. En de analyses uit hoofdstuk 5 tonen aan dat sociale regulatie niet de oorzaak is van verbanden tussen sociale integratie en gezondheid.

Een ander mechanisme dat in de literatuur wordt gesuggereerd, is dat integratie zou kunnen leiden tot psycho-fysiologische veranderingen (zoals een verhoogde bloeddruk), die de gevoeligheid voor ziekte zouden kunnen beïnvloeden. Minder sociale contacten worden verondersteld te leiden tot een slechtere fysiologische of psychologische status wat op zijn beurt weer zou kunnen leiden tot gezondheidsklachten (Berkman 1987). Dit mogelijke mechanisme wordt verondersteld te werken onafhankelijk van de stress die wordt ervaren. Onze analyses onderstrepen dat de causale richting van deze verbanden moet worden aangetoond met behulp van longitudinale studies, omdat het mogelijk is dat integratie de gezondheid beschermd, maar ook dat de gezondheid de mate van sociale integratie bepaalt.

Het omgekeerde mechanisme, de effecten van gezondheidsstatus op sociale netwerken, blijkt een heel ander terrein binnen de literatuur te vormen. Wij stellen echter dat deze effecten ook met behulp van de theorie van het sociale kapitaal kunnen worden gespecificeerd. Janssen (1992) beschreef al waarom sociale contacten beïnvloed zullen worden door gezondheidsstatus. Wij hebben geprobeerd haar werk te verdiepen in die zin dat we beschrijven welke contacten met name gevoelig zijn voor het proces van selectie in het netwerk door een chronische ziekte. We introduceren ook het concept van "sociale" ernst van chronische ziekten, om aan te geven welke ziekten het sociale netwerk sterker zullen beïnvloeden. De cross-sectionele aard van onze gegevens lijkt op het eerste oog problematisch voor het toetsen van deze hypothesen. Omdat we zijn geïnteresseerd in de effecten van het lijden aan een chronische ziekte op het sociale netwerk, zouden kenmerken van sociale netwerken en het beloop van een ziekte vanaf voordat de ziekte van zich doet spreken tot een lange periode daarna moeten worden bestudeerd. Deze verzameling van gegevens zou moeilijk en kostbaar zijn geweest. Een optie waar we lang over hebben nagedacht is om de sociale netwerken van mensen die lijden aan een chronische ziekte te vergelijken met de netwerken van gezonde mensen. Omdat deze twee groepen mensen al verschillende soorten netwerken kunnen hebben gehad voordat de ziekten zich openbaarden, valt op deze manier niet vast te stellen wat het effect van de ziekte is op het sociale netwerk. Daarom hebben we besloten om de effecten van de duur van ziekten op het sociale netwerk te bestuderen. Daarbij hebben we met een aantal factoren (zoals bijvoorbeeld de fase in de levenscyclus) rekening gehouden, om er zeker van te zijn dat de gevonden verschillen ook echt te wijten zijn aan de duur van de chronische ziekte en niet aan andere verschillen. In hoofdstuk 7 tonen we de resultaten van de toets van deze hypothesen. Alhoewel onze analyses niet veel statistisch significante verbanden aantonen, kunnen we toch concluderen dat sociaal ernstiger ziekten een negatieve invloed hebben op het sociale netwerk. Dit blijkt onder andere uit het feit dat mensen die langer ziek zijn minder vrienden en steun-gevers hebben, en ook minder vaak actief zijn buiten hun huishouden. Sociaal milde ziekten bleken geen negatieve invloed op het sociale netwerk te hebben.

Zoals bovenstaande beschrijvingen al aangeven, vormen de cross-sectionele aard van onze gegevens en het gebrek aan bepaalde gegevens over leden van het sociale netwerk (met name de normen ten aanzien van gezondheid van netwerkleden, in hoofdstuk 5) de belangrijkste methodologische problemen in deze studie. De cross-sectionele aard van de gegevens blijkt een groot probleem in de analyse van buffer-effecten. In deze analyses vinden we een "mobilisatie" van steun: mensen die meer gevolgen ondervinden van stress ontvangen ook meer steun. Buffer-effecten (van de mensen met stress ondervinden zij die meer steun ontvangen minder gevolgen) hebben we niet vast kunnen stellen. Dit kan een probleem van tijd zijn, omdat we alleen beschikten over cross-sectionele gegevens en mensen niet lang genoeg hebben gevolgd. Op basis van onze resultaten uit hoofdstuk 6 en 7 concluderen we dat effecten van sociale netwerken op gezondheid of vice versa echter waarschijnlijk alleen optreden bij zeer ernstige ziekten of gebeurtenissen. Het kan zeer moeilijk zijn deze effecten te vinden in een algemene populatie, zoals wij hebben onderzocht. Daarom concluderen we dat het in toekomstig onderzoek nodig zal zijn om respondenten streng te selecteren op ernst van gebeurtenissen of ziekten.

Deze methodologische tekortkomingen zouden kunnen verklaren waarom we niet veel ondersteuning vinden voor onze hypotheses. Maar ons onderzoek heeft ook enkele grote methodologische voordelen ten opzichte van andere studies. Omdat wij beschikten over zeer diverse gegevens bleek het mogelijk verschillende mechanismen te toetsen. We hebben gebruik kunnen maken van meerdere indicatoren van gezondheid en van sociale netwerken. Het grootste voordeel van ons onderzoek is echter het grote aantal respondenten waarover we konden beschikken, die representatief bleken voor de Nederlandse populatie. Eén van de gevolgen van het expliciet formuleren en toetsen van hypothesen zoals wij hebben gedaan, is dat het mogelijk is dat deze hypothesen worden weerlegd.

Een sterker onderzoeksdesign zou meer ondersteunend bewijs voor onze hypothesen hebben kunnen opleveren. Desalniettemin willen we ook een belangrijke kwestie ten aanzien van onze theoretische benadering aan de orde stellen. De ideeën over mechanismen achter de relatie tussen sociale netwerken en gezondheid zijn ontwikkeld vanuit een sociologische theorie. Wij hebben geen psychologische of psycho-fysiologische mechanismen bij onze theorie betrokken. De theorie die we hebben ontwikkeld is niet compleet in die zin dat we ons bewust zijn dat er grote verschillen zullen bestaan in de inter-persoonlijke inhoud van contacten. Er is een verschil in vertrekpunt tussen sociologen en psychologen die de relatie tussen sociale netwerken en gezondheid bestuderen. Psychologen zijn hoofdzakelijk geïnteresseerd in de acties en percepties van het individu, terwijl sociologen zich meer bezig houden met de structurele omgeving waarin individuen zich bevinden. Deze omgeving, zoals in ons onderzoek het sociale netwerk, wordt verondersteld de gezondheid te beïnvloeden middels sociale regulatie en sociale steun. En de omgekeerde relatie van gezondheid met sociale netwerken wordt verondersteld effectief te zijn via sociale selectie. Pearlin (1989, p. 250) stelt dat coping en misschien ook gevoel van eigenwaarde, beheersing en persoonlijkheid ook van sociologisch belang zijn. Belangrijke elementen van coping bijvoorbeeld, kunnen worden verklaard vanuit de groep waarin iemand zich beweegt, net zoals andere vormen van gedrag aangeleerd en geïnternaliseerd zijn. Wij veronderstellen dat het ook zo zou kunnen zijn dat mensen met gelijke netwerk-kenmerken verschillende coping-stijlen hanteren. Sociologisch of niet, voor een volledig begrip lijkt het zeker de moeite waard om dit soort psychologische factoren te betrekken bij nieuwe modellen van de relaties tussen sociale netwerken en gezondheid. Onze resultaten (zonder psychologische factoren) geven geen sluitend bewijs dat de relaties tussen sociale netwerken en gezondheid zo in elkaar zitten als wij ze theoretisch hebben gespecificeerd.

Recent hebben Cohen (1988) en Schwarzer en Leppin (1991) modellen over de relaties tussen sociale netwerken en gezondheid voorgesteld waarbij sociologische en psychologische mechanismen zijn geïntegreerd. Deze modellen zijn opgezet vanuit het gezichtspunt van verschillen typen steun. Uitgaande van het werk van House, Umberson en Landis (1988) richten Schwarzer en Leppin (1991) zich op de inhoud van sociale relaties als de belangrijkste factor in de relatie tussen sociale netwerken en gezondheid. De andere aspecten van sociale netwerken, sociale integratie en de structuur van sociale netwerken, worden verondersteld de daadwerkelijke of ervaren inhoud van sociale relaties te beïnvloeden. De inhoud van sociale relaties kan bestaan uit informatie, identiteitsbevestiging en gevoel van eigenwaarde, sociale invloed, en praktische steun (Cohen 1988). Op deze manier worden twee van de mechanismen die wij hebben gespecificeerd (sociale regulatie (of invloed), en sociale steun zoals praktische steun en informatie) aangevuld met een meer psychologisch mechanisme van identiteitsbevestiging en gevoel van eigenwaarde. Schwarzer en Leppin (1991) wijzen op het verschil tussen "cognitieve" (of ervaren) en "gedrags-" (of ontvangen) sociale steun. In hun model is zowel plaats voor "directe-" als voor "buffer-" effecten van sociale steun. Deze onderzoekers specificeren niet het mechanisme van sociale regulatie als een mogelijke verklaring (terwijl Cohen dat wel doet), en zij gaan ook niet in op de mogelijke effecten van de gezondheidsstatus op sociale netwerken. Cohen is ook niet ingegaan op dit omgekeerde mechanisme, omdat hij vooral geïnteresseerd is in de etiologie van ziekten.

Toekomstig onderzoek, zo denken wij, zou veel baat hebben bij een integratie van de theorie van het sociale kapitaal en de modellen zoals die door Cohen (1988) en Schwarzer en Leppin (1991) worden voorgesteld. Door factoren zoals coping, identiteitsbevestiging, gevoel van eigenwaarde, en het ervaren van sociale steun op te nemen in de specificaties die via de theorie van het sociale kapitaal zijn opgesteld, kunnen de mechanismen van "directe-", "buffer-" en selectie effecten nader worden uitgediept en beter worden getoetst. Toekomstig longitudinaal onderzoek gebaseerd op dit nieuwe model zal zeer waarschijnlijk wel duidelijke effecten van sociale netwerken op gezondheid en vice versa vinden. Hoe dan ook, het toevoegen van een aantal psychologische kenmerken in de empirische analyse staat niet gelijk aan theoretische integratie, dus er is nog veel theoretisch werk te doen.

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I was born in Amersfoort, on March 24 1966. After obtaining my pre-university certificate (VWO) in 1984, I studied sociology at the University of Utrecht. In 1988 I graduated in the department of Empirical and Theoretical Sociology. Directly after graduation, I started working at the NIVEL, the Netherlands Institute of Primary Health Care, in Utrecht. From September 1988 to February 1989 I was involved in a project on the orientation towards help-seeking for emotional problems. From March 1989 to August 1990 I worked on a project concerning the course of psychosocial problems in general practice. Both projects were part of the National Study of Morbidity and Interventions in General Practice. From September 1990 to September 1993 I worked at the NIVEL for NWO (Dutch foundation for scientific research, NWO:500-279-202) on a project called "Social networks and health". This project, also based on material from the National Study, resulted in the book you are reading. From September 1993 I have been working as a social epidemiologist in the department of cardiovascular and diabetes epidemiology, at the centre for chronic diseases and environment epidemiology of the Netherlands Institute of Public Health and Environment Protection (RIVM). As such I investigate psychosocial factors related to chronic diseases.