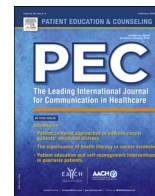




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### Social support

## Social support and self-management capabilities in diabetes patients: An international observational study

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### ABSTRACT

**Objective:** The objective of this study was to explore which aspects of social networks are related to self-management capabilities and if these networks have the potential to reduce the adverse health effects of deprivation.

**Methods:** In a cross-sectional study we recruited type 2 diabetes patients in six European countries. Data on self-management capabilities was gathered through written questionnaires and data on social networks characteristics and social support through subsequent personal/telephone interviews. We used regression modelling to assess the effect of social support and education on self-management capabilities.

**Results:** In total 1692 respondents completed the questionnaire and the interview. Extensive informational networks, emotional networks, and attendance of community organisations were linked to better self-management capabilities. The association of self-management capabilities with informational support was especially strong in the low education group, whereas the association with emotional support was stronger in the high education group.

**Conclusion:** Some of the social network characteristics showed a positive relation to self-management capabilities. The effect of informational support was strongest in low education populations and may therefore provide a possibility to reduce the adverse impact of low education on self-management capabilities.

**Practice implications:** Self-management support interventions that take informational support in patients' networks into account may be most effective, especially in deprived populations.

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### 1. Introduction

Ageing populations and lifestyle related factors are amongst the factors contributing to an increasing prevalence of many long-term conditions, including type 2 diabetes [1,2]. This increase is likely to be higher in groups with a low income and education because they

have an increased risk of developing diabetes, as well as of presenting a poorer control of their condition [3]. Effective self-management, as part of the chronic care model, can help to improve health outcomes and reduce costs [4]. Many educational and counselling interventions have been developed to support behaviour change and to improve self-management of people with long-term conditions. Research on educational and behaviour change programmes for chronic conditions has found varying degrees of success [5]. Not only does the effect of these interventions vary, they also have less impact amongst groups with low income and education [6]. Many of the available

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educational and counselling interventions are expected to increase self-management capabilities, such as insight in disease mechanisms, self-monitoring, knowledge, and skills, making use of behaviour change techniques (such as goal setting). This is illustrated by a review that produced an overview of 112 theoretical constructs in behaviour change, resulting in 14 domains of which 12 domains were related to individual traits [7]. However, the focus on these individual capabilities may have narrowed the view on what influences self-management and may have missed contextual influences.

When broadening the view to patients' context, a complementary strategy to contribute to individual self-management capabilities and behaviours is to enhance social support from personal networks and community organisations. Social support is defined as help provided by family, friends, neighbours, or others and includes different domains, such as information, emotional comfort, and practical help [8]. Previous studies have shown that social support and social networks influence health behaviours and health outcomes [9–13]. This social context may be particularly relevant for people experiencing economic and social deprivation or social isolation, since they have a higher risk of developing diabetes [3]. Moreover, self-management interventions maybe less effective for these populations than for those who are more advantaged [6]. Support from social networks might provide an opportunity to compensate to an extent for these inequalities in health.

To explain how social networks can impact on health, several mechanisms have been proposed. Network members can provide informational, practical or emotional support. Another mechanism concerns the role of social networks in patients' navigation to resources (individuals, groups, organisations, and online resources) [14,15]. Navigation refers to identifying and connecting with relevant existing resources that are available in a network, such as information and support [15]. From the perspective of the individual, access to social support can be characterized as social capital. This social capital can be accessed through weak ties, for example through community organisation or relevant professionals in someone's wider network. Another mechanism is contagion: the spread of behaviour, knowledge, and attitudes in populations which is influenced by social networks. This has been suggested to explain the impact of being embedded in a group or population, such as a family, community organisation, or a neighbourhood [16]. Psychological mechanisms such as imitation of successful behaviours, role modelling, social comparison and exchange of resources may explain the effect of contagion. In addition to social influence from network members, there is also a selection mechanism: networks members are selected on the basis of similarity between a person and potential network members. Both mechanisms (contagion and selection) result in higher homogeneity in networks and create an interaction between composition and content of the network [17]. In other words, social support networks may influence the content and strength of self-management capabilities, while these capabilities may also influence the support network.

However, insight into the linkages between individual self-management capabilities and support networks in real patient populations is limited. Most previous studies focused on single factors, such as group-based self-management support interventions or self-management interventions with partner involvement [18,19]. Studies on the simultaneous influence of personal, community organisations and neighbourhood networks seem to be lacking. Therefore, the relative impact of different network characteristics remains unclear. Also, it is unclear whether support networks in deprived patient populations could reduce the adverse effects of a low education.

In this study, we described the personal networks of type 2 diabetes patients and explored which aspects of these networks relate to self-management capabilities, using data from a study in six European countries. Moreover, we explored whether social context factors such as personal networks, community organisations and neighbourhoods can compensate the adverse health effects of a low education by assessing the relationships between self-management capabilities and personal network aspects in high and low education groups.

## 2. Methods

### 2.1. Study design, setting and participants

An international cross-sectional study in patients with type 2 diabetes was conducted. Data were collected as part of the EU-WISE project [20]. The study was conducted in 18 purposefully chosen geographical areas in six countries, reflecting a variety of health and welfare systems: Bulgaria, Greece, the Netherlands, Norway, Spain, and the United Kingdom. Within each participating country, one deprived urban area; one relatively affluent urban area; and one deprived rural area (relative to country) was selected. Urban was defined as located in a city with more than 100,000 inhabitants, whereas rural was defined as located in towns or villages with fewer than 30,000 inhabitants. This stratified sampling of areas (rather than a completely random sample in each country) allowed us to study both individual and area characteristics. Because the areas were chosen purposefully, these are not necessarily representative for the countries involved. In each area, 100 patients with a diagnosis of type 2 diabetes were recruited, resulting in about 300 patients in each country. This number allowed us to detect a medium effect size ( $f^2=0.15$ ) based on  $\alpha=0.05$ , intraclass correlation coefficient (ICC)=0.03, power=0.80 and the inclusion of eight independent variables in the analysis [20,21]. Patients attending primary or ambulatory healthcare practices in the defined geographic areas were recruited. This method of recruiting has the advantage of a confirmed diagnosis of diabetes by a physician and provides the possibility of a face-to-face contact with the patient. This personal contact can enhance participation, but inhibited the calculation of a meaningful response rate. Inclusion criteria were: medical diagnosis of type 2 diabetes and aged 18 years or over. Exclusion criteria were: pregnancy; pregnancy-related diabetes; recent/current major surgery or medical procedures; severe cognitive or psychiatric handicap; terminal illness/receiving palliative care; absence of translators (e.g. family members) for patients with insufficient language skills. Eligible patients were given an invitation letter with information, a consent form, and a written questionnaire via their healthcare practice. Participating patients were invited to take part in an interview as well. Ethical committees in the participating countries provided approval for the study.

### 2.2. Measures

Data collection consisted of two parts: the first part was a written questionnaire with validated measures recording demographic variables, co morbidities (high blood pressure, high cholesterol, angina pectoris, heart attack, coronary surgery, heart failure, transient ischaemic attack, stroke, peripheral arterial disease), participation in local organisations and self-management capabilities; the second part was a pre-structured face-to-face or telephone interview, focussing on social networks and social support. We chose for interviews for the social network questions, based on pilot testing in 25 diabetes patients, suggesting that

written surveys of these measures were not feasible in the targeted population.

### 2.3. Social support measures: individual support networks and community organisations

Data on the number of household members, presence of spouses and participation in community organisations were gathered using structured questions. Participating in community organisations was defined as visiting a community group, activity or service from a community group at least once a month within the last 6 months. Data on individual support networks was collected through interviews using a validated name generator method in which participants were asked to generate a list of persons that were valuable to them [22]. This method first requires a respondent to name actual persons and then several additional questions about these individuals are asked. For each individual mentioned through the name generator additional data was derived such as age, gender, type of relationship with the respondent, and whether a member provided informational, practical or emotional support. Informational support was defined as exchanging information related to dealing with someone's illness; practical support as providing help with practical things in and around the house; emotional support was defined as talking about health problems or other personal issues [8]. Network members were divided into three types: family members, non-family members (friends, neighbours), and healthcare professionals. Finally, the position generator was used to identify access to specified professionals (nurse, doctor or pharmacist). This method measures access to network members' occupation that functions as a source for social capital [23]. Unlike the patient's self-reported support network, which only included close members, the professionals identified through the position generator could be part of patient's wider environment.

### 2.4. Individual demographic measures

In this study we used education as a proxy for SES, because self-management capabilities are often linked to educational interventions [24]. Low education was defined as an education up to secondary school, whereas college and university were defined as high education. Besides education, income, origin of the parents, and a short list of nine comorbidities were measured. We measured income relative to the country's average income. Respondents answered whether their income was below/about/above the country yearly average income (BG 4500 lev; GR 12,000 EUR; NL 33,000 EUR; NO 350,000 Nkr; ES 22,800 EUR; UK 25,000 pound). Low income was defined as income below the country yearly average income for each country.

### 2.5. Self-management capabilities

In this paper we focused on the necessary capabilities to manage illness related symptoms successfully. To measure these capabilities, we used two domains of the validated Health education impact questionnaire (HeiQ). The domain 'self monitoring and insight' (SMI) captures the individual's perceived ability to monitor the condition, and the ability to reflect on how self-management actions influence the physical and emotional status. High scores indicate a good self-monitoring, self-management, setting reasonable limits or targets, and insight into living with a health problem [25]. This scale consists of 6 items, such as 'With my health in mind, I have realistic expectations of what I can and cannot do' and 'I know what things can trigger my health problems and make them worse'. The domain 'skill and technique acquisition' (STA) consists of 4 items on knowledge-based skills and techniques that

are important for patients to manage their condition. High scores are characteristic of someone who has highly developed skills in symptom relief and techniques to manage own health [25]. Examples of items in this domain are: 'When I have symptoms, I have skills that help me cope' and 'I have a very good idea of how to manage my health problems'. Scores on all items could vary from 1 (strongly disagree) to 4 (strongly agree) and both scales (SMI and STA) were calculated as the mean of the individual items and therefore ranged from 1 (min) to 4 (max).

Measures that were not yet available in all countries were translated into the specific language using forward- and back-translation, and were culturally adapted to the specific country characteristics. In Bulgaria, two researchers independently translated the HeiQ and RAPA into the Bulgarian language. Consensus on both translations was done by a third researcher and the final version of the translated questionnaire was translated back by a professional translator. For the HeiQ, an extensive discussion on the translation with the developer of the HeiQ (Richard Osborn, Deakin University) was also included, so that they received an official licence for use in Bulgaria. In Greece, the RAPA was translated by three researchers and a professional translator independently. After reaching consensus, back translation was done by the same team and cultural adaptations were made. The newly translated questionnaire was pilot tested in three diabetes type 2 patients in order to test clarity and understanding.

### 2.6. Statistical analysis

To determine the effect of social support on self-management capabilities, we performed a regression analysis with self-management capabilities as dependent variables and social support characteristics as independent variables. Both the HeiQ scales were treated as interval scale and therefore analysed using ordinary least squares (OLS) regression model. The regression analyses were based on a multilevel model with a random intercept with patients nested both within areas and in the six participating countries [26].

We first analysed the whole sample, taking level of education into account. Secondly, we explored whether social support has the same effect on self-management capabilities in high and low education groups. Countries and areas were not randomly sampled, and therefore, generalisation beyond chosen areas and countries was avoided. In all analyses, we controlled for patients' age, gender, comorbidity, parents born in other countries, and income as potential confounders. Significance was indicated by  $p < 0.05$  and analyses were performed using IBM SPSS statistics 20 (IBM Corp.).

## 3. Results

In total 1861 patients completed the written questionnaire, of which 1692 participated in the interview. The average age was 66.1 years, ranging from 59.8 in Norway to 69.3 in Spain. Men and women were equally present (50.0% female), but ranged from 38.5% female in Norway up to 61.1% in Bulgaria. Overall, 6.0% had a parent that was born abroad, mostly in the Netherlands (13.9%) and Norway (14.4%). The majority had a low income relative to country average (61.0%; range 46.2% in Norway–81.1% in Spain) and low education (61.5%; range 38.7% in Bulgaria–90.6% in Spain), reflecting the focus of the study on deprived populations. Participants reported an average of 3.2 connections (median 3) with individuals providing some kind of support. Respondents in Greece reported the least connections (2.2), respondents in the Netherlands and UK most (4.1). Emotional support was the most prevalent form of support with an average of 2.5 network members, followed by 1.9 for information support and 1.5 for

practical support. Information support shows the largest difference between countries from only 0.9 in Greece up to 2.8 supportive members in the UK. Nearly half (48.3%) had healthcare professionals in their extended network which varied from 31.4% in Spain up to 57.6% in Greece. About a third (34.6%) participated in community organisations, mostly in the Netherlands (44.1%) and the least in Norway (23.7%) (Table 1).

Table 2 presents the results of the analyses with the association between individual and social network characteristics and self-management capabilities. Low education ( $\beta = -0.11$ ;  $p < 0.01$ ) and more practical support members ( $\beta = -0.06$ ;  $p = 0.04$ ) were associated with lower SMI. More network members providing information support ( $\beta = 0.09$ ;  $p < 0.01$ ) or emotional support ( $\beta = 0.11$ ;  $p < 0.01$ ), and participation in community organisations ( $\beta = 0.06$ ;  $p = 0.03$ ) were associated with higher SMI. The association with the number of network members who provided information support was especially strong in the low education group ( $\beta = 0.13$ ;  $p < 0.01$  vs  $\beta = 0.05$ ;  $p = 0.29$ ), whereas the association with the number of emotion support network members seems stronger in the higher education group ( $\beta = 0.18$ ;  $p < 0.01$  vs  $\beta = 0.07$ ;  $p = 0.21$ ). Low education ( $\beta = -0.10$ ;  $p < 0.01$ ) and low income ( $-0.09$ ;  $p < 0.01$ ) were both associated with lower STA. Regarding the social network factors, only the number of network members providing information support was related to higher STA ( $\beta = 0.09$ ;  $p < 0.01$ ),

especially for low income populations ( $\beta = 0.11$   $p < 0.01$  vs  $\beta = 0.05$   $p = 0.23$ ). Within the low education group, having a healthcare professional in someone's wider network was associated with higher STA ( $\beta = 0.07$ ;  $p = 0.04$ ). For the high income group, having a spouse was related to higher STA ( $\beta = 0.12$ ;  $p < 0.01$ ), whereas the number of household members was associated with lower STA ( $\beta = -0.11$ ;  $p = 0.02$ ). The proportion explained variance (adjusted *R* square) by this model was 0.061 for 'self-monitoring and insight' and 0.067 for 'skill and technique acquisition'.

## 4. Discussion and conclusion

### 4.1. Discussion

Our findings are partly consistent with other studies that focus on the influence of social support and social networks. The mixed effect of individual support networks was also found in a systematic review reporting tentative evidence for social support [27]. The finding that a large information network is beneficial for self-management capabilities, especially in low education populations, provides additional information about the influence of networks [28,29]. We found that resources available in a network can influence individual capabilities, but that this relationship is not necessary equally strong for all type of networks. For example,

**Table 1**  
Description of patient samples.

	Total (n = 1692)	Bulgaria (n = 283)	Greece (n = 302)	Netherlands (n = 245)	Norway (n = 291)	Spain (n = 290)	UK (n = 281)
<b>Individual characteristics</b>							
Sex (% female)	50.0	61.1	57.3	43.8	38.5	55.9	40.0
Age in years (mean)	66.2	65.2	69.0	68.4	59.8	69.3	65.5
Parents born in other country (%)	6.3	0.4	8.6	13.9	14.4	1.0	– <sup>b</sup>
Pet in household (% yes)	38.0	55.0	53.5	29.1	30.7	30.5	27.3
Retired (%)	62.3	70.9	72.7	60.6	29.7	75.3	64.4
Low income (%)	61.0	69.3	55.5	47.5	46.2	81.1	65.6
Low education (%)	61.5	38.7	73.0	62.4	47.6	90.6	55.7
<b>Comorbidities</b>							
0 Comorbidities	14.8	7.4	7.6	13.5	15.1	19.3	26.3
1–2 Comorbidities	57.4	52.7	60.6	61.2	51.2	59.7	59.4
>2 Comorbidities	27.8	39.9	31.8	25.3	33.7	21.0	14.2
<b>Social network characteristics</b>							
Spouse (% yes)	70.5	62.1	70.9	74.7	65.6	81.2	71.0
Household members (mean)	2.3	2.6	2.3	1.9	2.0	2.6	2.0
Network members (mean)	3.2	2.7	2.2	4.1	3.3	3.0	4.1
<b>Network members providing</b>							
Information support	1.9	1.9	0.9	1.6	1.9	2.2	2.8
Practical support	1.5	1.8	1.2	1.2	1.2	1.6	1.8
Emotional support	2.5	2.7	2.1	2.5	2.6	2.6	2.8
<b>Network members type</b>							
Family members	2.0	1.7	2.1	2.3	1.7	1.8	2.2
Nonfamily members	0.5	0.5	0.1	0.6	0.8	0.2	0.9
Healthcare professionals	0.7	0.5	0.0	1.2	0.8	1.0	1.0
Healthcare professional in wider network (% yes)	48.3	54.8	57.6	47.8	49.8	31.4	48.0
Participating in community organisations (%)	34.6	37.8	24.8	44.1	23.7	41.4	38.1
<b>Residential area</b>							
Urban deprived	35.9	35.3	32.8	37.6	35.4	33.1	42.3
Urban affluent	39.1	32.2	32.8	21.6	30.6	32.8	57.7
Rural deprived	25.0	32.5	34.4	40.8	34.0	34.1	– <sup>a</sup>
<b>Self-management capabilities</b>							
Self monitoring and insight	3.11	2.98	2.98	3.11	3.25	3.11	3.22
Skill and technique acquisition	2.89	2.74	2.77	2.98	3.06	2.81	3.00

<sup>a</sup> Not included in sampling.

<sup>b</sup> Not recorded.

**Table 2**

Linear standardised regression estimates (beta) for the relation between social support and self-management capabilities.

	Self monitoring and insight			Skill and technique acquisition		
	Overall multivariate	Low education group	High education group	Overall multivariate	Low education group	High education group
Age (10 year steps)	−0.01	−0.03	0.02	−0.02	−0.04	0.01
Sex (male ref.)	0.00	0.00	0.02	0.03	0.02	0.06
Low income	−0.04	−0.04	−0.04	−0.09*	−0.09*	−0.10**
Parents born in other country	−0.04	−0.01	−0.06	−0.02	−0.02	−0.04
No comorbidities (ref.)						
1–2 Comorbidities	−0.07*	−0.06	−0.11*	−0.10**	−0.11	−0.12*
>2 Comorbidities	−0.04	−0.02	−0.09	−0.07	−0.09	−0.05
Low education	−0.11**			−0.10**		
Social network characteristics						
Spouse	0.03	0.00	0.07	0.05	0.01	0.12**
Household members	0.00	0.01	−0.03	−0.03	0.00	−0.11*
Network members providing						
Information support	0.09**	0.13**	0.05	0.09**	0.11**	0.05
Practical support	−0.06*	−0.09*	0.00	−0.05	−0.07	0.01
Emotional support	0.11**	0.07	0.18**	0.03	0.05	0.04
Number of family members	−0.06	0.00	−0.16**	0.00	0.00	−0.03
Number of nonfamily members	−0.02	−0.02	−0.05	0.01	0.01	−0.02
Health professional in wider network	0.04	0.05	0.02	0.04	0.07*	−0.02
Participating in community organisations	0.06*	0.05	0.07*	0.03	0.03	0.04
Neighbourhood (urban affluent = ref.)						
Urban deprived	0.02	0.03	−0.05	0.02	0.05	−0.05
Rural deprived	0.05	0.02	0.12	0.01	0.00	0.04
Adjusted R-square	0.061	0.034	0.061	0.067	0.049	0.048

\*  $p < 0.05$ .\*\*  $p < 0.01$ .

a more extensive informational support network may mean that individuals have access to different types of information, which is not available from one person only, and can compare these sources of information. This seems more relevant for people with a lower education whose network, due to homogeneity tendencies, might include less accurate information if this is provided by only one network member [17]. Although previous research found different effects for support provided by family or provided by non-family members, we did not find a significant difference between these types of network members [30,31]. Therefore, we conclude that it is more important how many network members provide informational or emotional support than if this person is a family member or not.

A strong aspect of this study is that the involved countries reflect a variety of health and welfare systems and policies in response to austerity in Europe. This enhances the robustness and generalizability of the findings. The focus on areas made it possible to combine various types of social support (from individual networks, community organisations, and neighbourhoods) in one analysis. While we used previously validated measures and methods, the study has a risk of bias due to non-identified differences in national health systems and cultures. Also, the cross-sectional design of the study did not allow causal inferences, so we could only speculate about mechanisms underlying the effect of social support. This is most prominent in the relationship between self-management capabilities and network composition. While self-management capabilities are shaped by the composition of someone's network, personal traits, related to self-management capabilities, might also influence the composition of the network. Therefore, there is a mutual relationship between these two factors which is hard to distinguish. To study the causality, a longitudinal study would be necessary.

#### 4.2. Conclusion

Education and income were negatively related to self-management capabilities, but larger informational and emotional support networks showed a positive association with self-management capabilities. The relative influence of social network characteristics was just as important as individual characteristics, but the total variance explained was low. Most obvious was that more network members providing information was consistently related to better self-management capabilities. This link was especially strong within the low education group, suggesting that people with a low education may benefit most from a large information network. Thus, this study provides evidence that strong social support may compensate for the adverse impact of low education, at least with respect to self-management capabilities of diabetes patients.

#### 4.3. Practice implications

Although the overall variance in self-management capabilities explained by the regression model was small, some guidance to strengthen self-management support interventions can be provided. Enlarging the number of network members providing information support can compensate for the adverse effects of deprivation. Therefore, interventions should not only focus on the individual patient, but also involve his/her social network to maximize this effect, especially in low education groups. This supports the involvement of patients' partners and groups in self-management support interventions [18,19]. However, how and whether such an intervention is effective should be tested in further research using a RCT design. Furthermore, the positive effect of participation in community organisations reflects the supportive function for self-management in people with chronic diseases. Policy makers may need to give consideration to

providing (increased) support to community organisations, to strengthen this function.

### Conflict of interest

None of the authors has something to disclose.

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The project was funded by the EU's Seventh Framework Programme, but there was no involvement in any stadium of the study of this funding source. As corresponding author, I had full access to all the data in the study and had the final responsibility for the decision to submit for publication.

### Ethics committee approval

Ethical committees in the different countries provided approval for the study.

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