

Social Relations and Smoking Behavior: Results from the First MONICA Survey Augsburg

Ursula Härte!l, Jutta Stieber¹, Ulrich Keil^{1,2}

GSF-Medis-Institut, Neuherberg, ² Ruhr-Universität Bochum

Introduction

Within the last decade several prospective community studies have found associations between the availability of social ties and mortality risks [1, 2, 3, 4]. In the nine year follow-up of Alameda County residents [1], the age-adjusted relative risks for those most isolated when compared to those with most social contacts were 2.3 for men and 2.8 for women. The mechanisms of how social ties may influence mortality are not yet well understood. In particular, we know little about the effects of social relations on specific disease outcomes (e.g. incidence and case-fatality of myocardial infarction), and about the specific links to behavioral and somatic risk factors. Since cigarette smoking is probably the most important cause of preventable disease in the world, and represents one of the key risk factors for coronary heart disease [5], the present analysis has two goals: first, to identify social factors that have an effect on smoking behavior and may contribute to a better understanding of 'risk groups'; and, second to generate hypotheses about possible pathways leading from social relations to myocardial infarction morbidity and mortality. The individuals of the present study will be followed up for ten years; therefore testing those hypotheses is one of our long term goals.

Study design and methods

The study was carried out as part of the psychosocial substudies in the MONICA-project Augsburg. The main objectives of the psychosocial substudies are: 1. The investigation of the relationships between psychosocial factors and the morbidity and mortality from myocardial infarction over ten years. 2. The investigation of the relationships between psychosocial factors and the prevalence and incidence of classical coronary risk factors such as smoking, hypertension, hypercholesterolemia and obesity. Figure 1 shows the social variables under study and those associations which are of central interest. The figure includes the hypothesis that the influence of social factors on disease can be either indirect through behavioral and somatic risk factors or direct; i. e. independent of those factors.

The study population of the present analysis comprises the participants of the first MONICA Survey, Augsburg, from 1984/85. A two stage cluster sample of 5,312 men and women, aged 25-64 was drawn in 1984 [8]. Of the 5,312 sampled individuals 5,069 were available (243 had changed addresses, had moved away

from the study area, had died or were hospitalized). 4,022 men and women participated in the first survey, resulting in a response of 79.4%.

The data were gathered in 16 examination centers through interview, a self-administered questionnaire, and physical examinations.

Measurement of social relations

In the present analysis the variable 'social relations' is mainly defined by a social network measurement as described in detail below. A further aspect of social relations that may have an influence on individual smoking behavior was covered by the interview question: 'Excluding yourself: Is someone else smoking in your household?'

The Social Network Index: With some modifications the Syme/Berkman social network scale, as used in the Alameda County Study [1] and proposed by Syme for the international MONICA project, was implemented to measure the social network components. The scale included four components: 1. Marital status; 2. Contacts with friends and family; 3. Church group membership; and 4. Group associations. In the Alameda County Study those components were used to construct a 'Social Network Index'. This index was based on the way in which mortality rates of various combinations of contacts clustered together [6].

In Augsburg, the construction of the Social Network Index differed slightly from the Alameda County Index in that marital status was coded differently, and the church group membership was included in the component group associations.

Component 1: Marital status. This item was measured by an interview question. For the construction of the Social Network Index it was coded as follows: Single, separated or divorced, or widowed: Code = 1; and, married, or 'living together': Code = 2.

Component 2: Contacts with friends and relatives. Component 2 is a combination of three items asked in the self-administered questionnaire: 1. How many relatives do you have that you feel close to? (Excluding children). 2. How many close friends do you have; i.e., people that you can talk to about personal matters? 3. How many of your close friends or relatives do you see at least once a month? The combination of the three questions resulted in a score with 4 categories.

An Index of Close Contacts (ICC) was constructed by a combination of component 1 (marital status) and component 2 (contacts with friends and relatives).

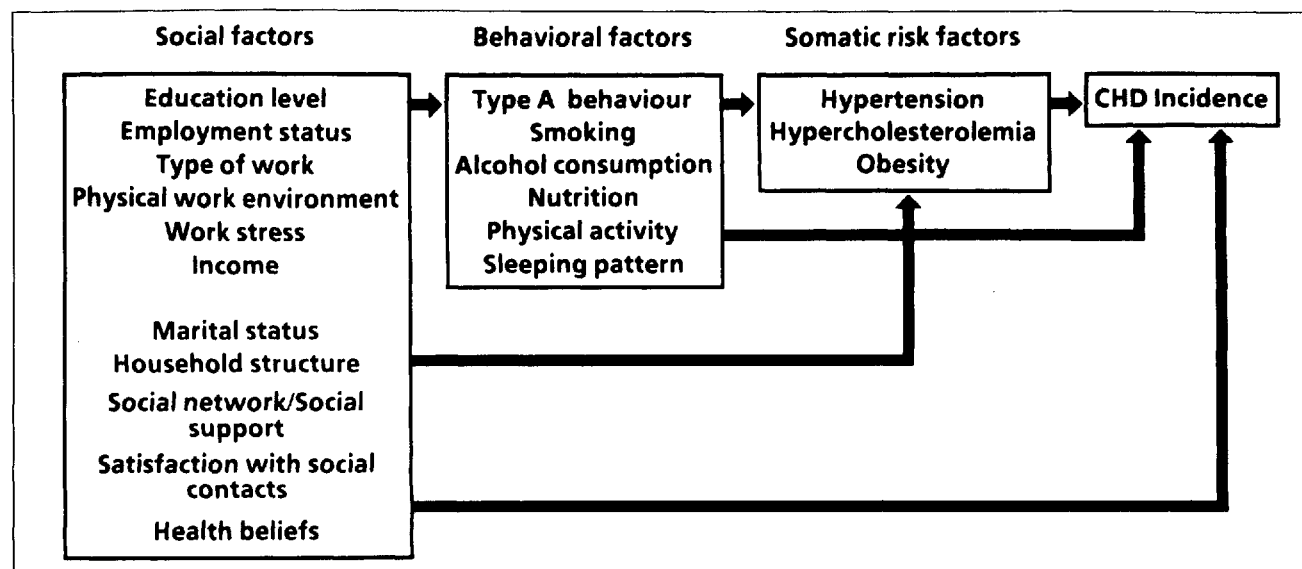


Fig. 1. Variables under study and associations of central interest. MONICA Project Augsburg.

Component 3: Group activities. One question in the self-administered questionnaire, related to group activities, was phrased as follows: 'Please indicate how often you take part in activities of the following groups or organizations?' Athletics club, social or charity group, hobby club (e.g. bowling, chess, music, etc.), health related self-help groups, another group or organization? Answer categories for each group were 'frequently', 'sometimes', 'never'. Respondents were coded according to how often they took part in activities of the mentioned groups: 0 = no activity in any group, 1 = sometimes or frequently active in one group, 2 = sometimes or frequently active in two or more groups.

The Social Network Index comprised all components as described above. It was actually based upon the combination of the Index of Close Contacts, which included component 1 and 2, and the 'group activities' (component 3), resulting in a weighted score with 4 categories (I = lowest score, IV = highest score).

Results

With regard to the risk factor smoking all analyses were carried out separately for the total four-level social network index and for the specific components of that index. Since the marital status was a very important component in relation to smoking, the age-standardized prevalences of smoking by marital status categories and gender will be presented first (Table 1). Men and women, who were widowed were excluded from this table, because very few men of our sample were widowed ($n = 22$) and very few of the widowed women were smokers ($n = 17$).

For both men and women there existed a strikingly high percentage of smokers among the separated or divorced individuals. Among men, 70% of the above categories smoked cigarettes compared to 37% of

those who were married, and 39% who were single (never married). For smokers, the mean number of cigarettes smoked per day was about the same for single and separated or divorced men ($\bar{x} = 24$ to 22 cigarettes), but somewhat lower for those who were married or 'living together' ($\bar{x} = 18$ cigarettes). Women in general were less likely to be smokers than men, however 42% of those who were divorced smoked as compared to only 22% or 23% of the two other groups. The mean number of cigarettes smoked was also highest among the separated or divorced women.

Figure 2 shows the prevalence of smoking 'more than five cigarettes per day' by Index of Close Contact scores and age groups among men and women. In every age group men who had the lowest contact scores were also most likely to be smokers. This ten-

Tab. 1. Age-standardized prevalences of smoking by marital status and sex (age 25–64).

	Single (n = 176)	Married or living together (n = 1730)	Separated or divorced (n = 93)
Men			
Percent cigarette smokers			
≥ 1 cigarette/day	39%	37%	70%
> 5 cigarettes/day	36%	32%	62%
Mean number of cigarettes smoked per day (Non-smokers excl.)	24	18	22
Women			
Percent cigarette smokers			
≥ 1 cigarette/day	23%	22%	42%
> 5 cigarettes/day	17%	15%	36%
Mean number of cigarettes smoked per day (Non-smokers excl.)	10	11	16

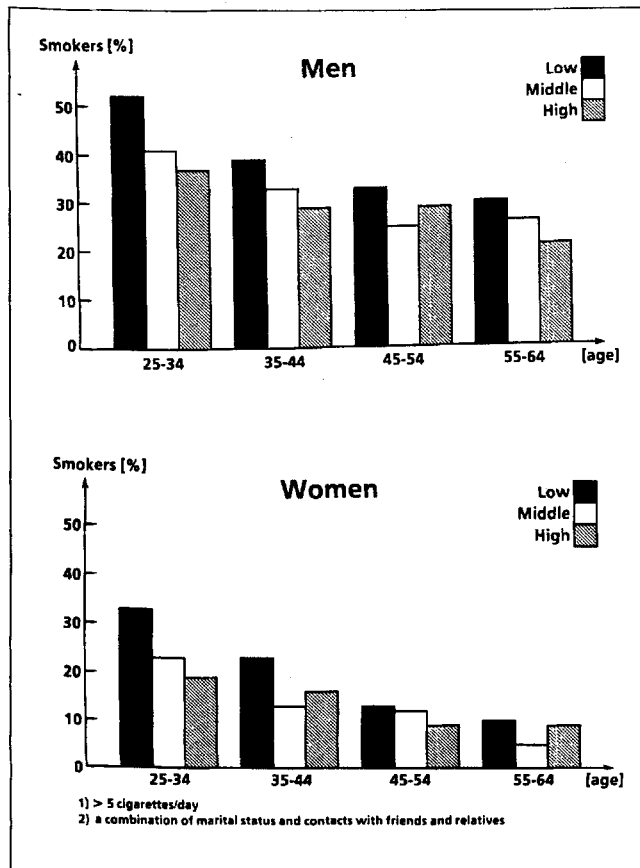


Fig. 2. Prevalence of smoking¹⁾ by low, middle, and high "close contact"²⁾ scores and age groups.

dency was strongest in the age group 25 to 34. A similar picture existed among women, but on a lower level, since fewer women than men were smokers, particularly above age 45.

Further analyses addressed the associations between activities in groups such as athletic clubs, hobby clubs, church groups or other groups and smoking. The relationships found were inconsistent. For example, individuals who were active in athletic clubs were in general just as often smokers as those who were active in other groups or who were not active in any group. But among women above age 45 those who were active in athletic clubs were *more often* smokers than those who were active in other groups or not active. Whether or not this could be a negative remnant of female emancipation, is only speculation.

Adding the variable 'Activities in groups' to the 'Index of Close Contacts' completed the total four level Social Network Index (SNI).

Multivariate analyses. We know from previous analyses [7] that in the Augsburg population, the educational level was significantly related to smoking. Among men aged 25-64, those with higher educational levels were less often smokers than those with lower educational levels. Among women the same held true only in the age group 25-34. Above age 35 the better educated women were more often smokers than those

who were less well educated. Thus, all multivariate analyses regarding the association between smoking and social network were controlled for education, and among women, also for employment status (employed women compared to housewives).

In logistic regression analysis smoking was studied as a function of the four social network categories, where I = lowest SNI-score and IV = highest SNI-score): Zero-one dummy variables were included for each category. The highest category (IV) was the reference category. For educational level, two zero-one dummy variables were included for 'primary school' and 'secondary school', while either 'intermediate' or 'university level' was the reference level.

Table 2 presents the logistic regression model of smoking among men and women by social network index categories and various educational levels, controlling for age. In these models, age was treated as a continuous variable, ranging from 25 to 64. Smoking 'more than 5 cigarettes per day' was chosen as the dependent variable, since the results from a similar model, using smoking '≥ 1 cigarette per day' as dependent variable were less consistent.

Among men the odds ratio for smoking was 1.8 (95%-CI 1.3, 2.5) for those in the lowest SNI-category (I) compared to those in the highest category (IV). Men with primary school level had odds of 2.1 (1.5, 2.8) compared with men of intermediate school or university level. Among women the effect of low SNI-scores on smoking was 2.0 (1.2, 3.1), when controlled for educational level. Entering the variable 'employment status' into the model did not change the effect of social network. For men and women the same model as described in table 2 was performed within different ten-year age groups (25-34, 35-44, 45-54, 55-64), and it was found that the effect of low SNI-scores on smo-

Tab. 2. Logistic regression model of smoking¹⁾ among men and women as a function of Social Network Index(SNI)-categories and educational level, controlling for age.

	β -coefficients	Odds ratios (95% CI)
Men (N = 1910)		
SNI: Low/high ²⁾	0.58**	1.8 (1.3, 2.5)
Primary school/intermediate or university	0.72**	2.1 (1.5, 2.8)
Secondary school/intermediate or university	0.44*	1.6 (1.1, 2.2)
Women (N = 1897)		
SNI: Low/high ²⁾	0.67**	2.0 (1.2, 3.1)
Primary school/intermediate or university	0.38 n.s.	1.5 (0.9, 2.4)
Secondary school/intermediate or university	0.32 n.s.	1.4 (0.8, 2.3)

¹⁾ Smoking: > 5 cigarettes/day

²⁾ Lowest compared to highest category (I/IV)

** p < 0.01 * p < 0.05 n.s. p ≥ 0.05

king for both men and women was highest in the age group 25 to 34, namely 2.7 (1.3, 5.5) for men, and 2.2 (1.0, 5.0) for women. Women aged 55–64 were excluded from this comparison since there were only 36 women who smoked more than 5 cigarettes per day in this age group. For both men and women we found no significant interaction effects of social network scores by education on smoking.

A further goal of the present study was to find out the possible influence of other household members on individual smoking or non-smoking. In univariate analyses it was interesting to find out that of the male smokers 42% answered 'yes' to the question 'Excluding yourself: Is someone else smoking in your household?', while only 21% of the male non-smokers responded affirmatively. Of the female smokers, 63% answered 'yes' to the same question compared to 33% of the non-smokers.

In the next step of multivariate analysis, we tried to quantify that effect with a similar logistic regression model as performed for the social network analysis. Again 'smoking more than five cigarettes' was the dependent variable, but now the SNI-categories were used as control variables as were educational level and age. The results of this model appear in table 3, showing the odds ratios of smoking for men and women living in a household with smokers in comparison to individuals not living in a household with smokers. Among men the odds was 2.6 (2.1, 3.1) and among women 2.8 (2.2, 3.7).

Discussion

The present analysis was a first attempt to clarify the interrelations between social network variables and coronary risk factors in the MONICA Augsburg population. Further analyses will include blood pressure levels, cholesterol levels, body mass index, and type A behavior. We also intend to apply simpler weightings of the Social Network Index as Schoenbach et al. [3] did with data from the Evans County Study. Another step of analysis will be the inclusion of social support components such as 'perceived adequacy' or 'confidant'-relationships.

Taking into account the limitations of cross-sectional

Tab. 3. β -coefficients and odds ratios of smoking as a function of 'household members' smoking», by sex, controlling for social network scores, education and age.

	β -coefficients	Odds ratios (95% CI)
«Household members smoking?»		
Men (N = 1908)		
Yes/No	0.94**	2.6 (2.1, 3.1)
Women (N = 1894)		
Yes/No	1.04**	2.8 (2.2, 3.7)

** p < 0.001

data, there are several statements we can make at present: For both men and women, it appeared that those with fewer social ties and a lower number of contacts had a higher probability of being smokers than those with more social ties and frequent contacts. The associations were found to be independent of the possible confounders, age, educational level, and, among women, of employment status. For our ten-year morbidity and mortality follow-up, we can therefore hypothesize that smoking will probably be a very important effect modifier of the expected influence of social network on disease. Results from Alameda County [1] also indicated a negative association between social ties and smoking, though the mortality gradient among different network groupings persisted while controlling for smoking status.

The analysis of specific social network components in Augsburg showed, that there were no significant associations of activities in groups e.g. athletic clubs 'hobby clubs', church groups to smoking, but rather between the frequency of contacts with close friends or relatives and smoking. The results also showed that living in a household with smokers may have a similar effect on smoking as does 'social isolation'.

For health education or intervention strategies, the present findings have two different implications. On one hand, we cannot deny that smoking is a group phenomenon and at least in our study population, should be treated on the group level, particularly on the family- and close-friend-level. On the other hand, smoking is a problem of individuals living alone or in isolation with the special characteristic that they are often not available and, therefore, may not be amenable to public health strategies.

Summary

This study examines the relationship between various aspects of social relations and the prevalence of smoking, using data from the first MONICA Survey, Augsburg, FRG. 1984/85. Study population of the survey was a two-stage cluster sample of 5312 men and women aged 25 to 64. The response was 79.4%. The measurement of social relations included a modified form of the Syme/Berkman social network scale, as used in the Alameda County Study. Analyses were carried out separately for the total four-level social network index in relation to smoking, and for specific components of that index (marital status, contacts with friends and relatives, activities in informal groups). The results showed for both men and women, that there was a significant association between the social network index and the prevalence of smoking: the more social ties and contacts, the lower the percentage of smokers. The results from multiple logistic regression analyses indicated an effect of social relations on smoking, that is at least partly independent of age, gender and educational level. In general, the findings may contribute to a better understanding of 'risk groups', and the possible pathways leading from social relations to health and disease.

Zusammenfassung

Soziale Beziehungen und Rauchverhalten. Ergebnisse der ersten MONICA-Augsburg-Querschnittsstudie

Mit Daten der ersten MONICA-Querschnittsstudie Augsburg, 1984/85, wurden die Zusammenhänge zwischen verschiedenen Merkmalen des «sozialen Netzwerks» und dem individuellen Rauchverhalten

untersucht. Die Studienpopulation umfasste 5312 Männer und Frauen einer zweistufigen Zufallsstichprobe im Alter zwischen 25 und 64 Jahren. Die Teilnehmerate betrug 79,4%. Die sozialen Beziehungen wurden in einem Fragebogen zum Selbstauffüllen mit Hilfe eines «Sozialen Netzwerk Indexes» (SNI) erfasst, der sowohl den Familienstand, die Kontakte zu Verwandten und engen Freunden als auch Aktivitäten in Gruppen und Vereinen beinhaltet. Die Ergebnisse zeigten für Männer und Frauen statistisch signifikante Zusammenhänge zwischen den Gesamtscores des SNI und der Prävalenz des Rauchens: Je mehr soziale Beziehungen und Kontakte, desto geringer war der Anteil Raucher. Die Analysen einzelner Komponenten des SNI ergaben: Es fanden sich keine konsistenten Zusammenhänge zwischen den Aktivitäten in Freizeitclubs und dem Rauchverhalten, jedoch zwischen familiären Beziehungen, Kontakten zu engen Freunden oder Verwandten und der Häufigkeit des Rauchens. Besonders auffallend war der hohe Anteil Raucher bei den geschiedenen oder getrenntlebenden Männern. 70% von ihnen waren Raucher im Vergleich zu 37% der verheirateten Männer. Die entsprechenden Anteile bei den Frauen waren 42% bzw. 22%. Die Ergebnisse der multiplen logistischen Regressionen zeigten einen Effekt der interpersonellen Beziehungen auf das Rauchverhalten, der unabhängig war von den Faktoren Alter, Geschlecht, Bildungsstand und (bei Frauen) von der Erwerbstätigkeit. Die Resultate könnten zu einer besseren Erklärung und Identifizierung von Risiko-Gruppen und damit zu einer erfolgreicherer Bekämpfung des Rauchens beitragen.

Résumé

Rapports sociaux et consommation de la cigarette

Les relations entre les différentes propriétés du «réseau social» et les habitudes individuelles en ce qui concerne la consommation de la cigarette ont été examinées à l'aide des données d'une première étude transversale, faite en région augsbourgeoise, dans le cadre du projet MONICA. L'échantillon aléatoire, divisé en deux étapes, comportait une population de 5312 hommes et femmes âgés de 25 à 64 ans. 79,4% des personnes interrogées participaient à l'enquête. Le recensement des rapports sociaux s'effectuait au moyen d'un questionnaire individuel à «l'Index du Réseau Social» (IRS) qui englobait aussi bien les données sur l'état civil que les sujets relatifs aux contacts sociaux et familiaux. Les résultats ont montré qu'il y avait une correspondance significative entre les valeurs totales du IRS et la prévalence de la consommation de la cigarette. Plus une personne avait de contacts sociaux, moins elle fumait de cigarettes. L'analyse des divers composants du IRS révèle un manque de relations cohérentes entre les activités dans les clubs de loisirs et la consommation de la cigarette. Cependant, la correspondance entre

les rapports de famille, les contacts avec amis et parents et la fréquence de la consommation du tabac s'avérait révélatrice. Particulièrement frappant était le taux élevé de fumeurs chez les hommes divorcés ou vivant séparés. 70% d'entre eux étaient fumeurs par rapport à 37% des hommes mariés. Le taux correspondant chez les femmes était de 42% resp. 22%. Les résultats de la régression logistique multiple signalaient un effet des relations interpersonnelles sur la consommation de la cigarette, un effet qui était indépendant des facteurs tels que l'âge, le sexe, le niveau d'instruction et (chez les femmes) des activités professionnelles. Ces résultats pourraient contribuer à une meilleure identification et caractérisation des groupes à risque, et par la suite à combattre d'une manière plus efficace la consommation de la cigarette.

References

- [1] Berkman LF, Syme SL: Social Networks, Host Resistance and Mortality: A nine-year follow-up study of Alameda County residents. *Am. J. Epid.* 1979; 109: 186-204
- [2] Reed D, McGee D, Yano K, Feinleib M: Social networks and coronary heart disease among Japanese men in Hawaii. *Am. J. Epid.* 1983; 117: 384-96
- [3] Schoenbach VJ, Kaplan BH, Fredman L, Kleinbaum DG: Social ties and mortality in Evans County, Georgia. *Am. J. Epid.* 1986; 123: 577-91
- [4] House JS, Robbins C, Metzner HL: The association of social relationships and activities with mortality: prospective evidence from the Tecumseh Community Health Study. *Am. J. Epid.* 1982; 116: 123-40
- [5] Aronow WS, Kaplan NM: Smoking. In: Kaplan NM, Stamler J (Ed.) *Prevention of Coronary Heart Disease*. Philadelphia: WB Saunders Company, 1983: 51-60
- [6] Berkman LF, Breslow L: *Health and ways of living*. New York: Oxford University Press, 1983: 113-60
- [7] Härtel U, Keil U: Psychosoziale Faktoren und Herz-Kreislauf-Erkrankungen. Laufende Studien und erste Ergebnisse im MONICA-Projekt Augsburg. *Fortschritte der Medizin* 1986; 104: 943-47
- [8] Chambless L, Cairns V, Herbold M, Doering A, Filipiak B, Schneller H, Viessmann M, Keil U: MONICA-Augsburg, Survey Sampling. München: GSF-Bericht 31/86 (1987)

Address for correspondence:

Dr. Ursula Härtel
GSF-Medis-Institut
Arbeitsgruppe Epidemiologie
D-8042 Neuherberg bei München