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Public perception of risk concerning celltowers and mobile phones

Summary

Objective: The controversy about health risks of electromagnetic fields (EMF) has contributed in raising fears concerning emissions from celltowers. The study was to examine whether or not neighbours of celltowers are particularly concerned about adverse health effects of mobile phones and their base stations.

Methods: Prior to information delivered by medical doctors of the Institute of Environmental Health at public hearings a questionnaire was handed out to participants asking for their personal rating of several environmental health risks including those of mobile telecommunication (n = 123, response rate approx. 48%). Medical students (n = 366) served as a contrast group.

Results: Participants rated health risk for both, mobile phones and celltowers higher as students. A trend for higher ratings was also seen with older subjects and female sex. The risk ratings of both exposures correlated well with each other. The magnitude of the perceived risks, however, resembled that of other ubiquitous exposures like traffic noise and air pollution.

Conclusion: Contrary to the claims of the telecommunication industry, opponents of celltowers generally do not express unusual fears concerning electromagnetic field exposure. The outcome of our study indicates that the risk rating is comparable with other perceived common hazards of the civilised world. It is hypothesised that offering information and participation to the concerned population will be efficient in reducing exaggerated fears.

Keywords: Electromagnetic fields – Risk perception – Cell tower – Mobile phones.

It seems that the secular success of mobile telecommunication came unexpected to the industry as well as to governments and regulatory authorities. Within a short time millions of people world-wide started to use a mobile phone regularly, and many mobile phone celltowers were erected in the midst of densely populated areas, considerably increasing exposure to high-frequency electromagnetic fields (Hamnerius & Uddmar 2000). No risk communication strategies were prepared by governments while legal provisions were made in most countries to facilitate development of mobile phone networks (Leiss 1998). Concerning risk assessment of mobile telecommunication there are still unresolved issues (World Health Organization 1997; Repacholi 1998; Hutter et al. 2001a) and a legitimate scientific controversy exists about long-term health effects from exposure to low-level electromagnetic fields. Due to the lack or late onset of credible risk communication strategies (see e.g., Independent Expert Group on Mobile Phones 2000) there is still considerable public concern about adverse effects of mobile phones and their base-stations. Local authorities as well as concerned citizens seek advice from public health services (Moshhammer et al. 2001) and environmental physicians (Hutter et al. 2001b). However, neither sufficient evidence is available to reassure the public that these devices pose no relevant health problem, nor is there reason to assume that every health problem occurring in temporal relationship to mobile phone use or the erection of a base-station was actually caused by these devices.

The use of mobile phones, although connected with much higher exposure to electromagnetic fields, seems to be more widely accepted. This could be due to the predominantly voluntary exposure by mobile phones as opposed to the involuntary exposure to emissions from celltowers.

Objectives

The study was conducted to examine whether or not neighbours participating in public hearings conducted in connection to the erection of celltowers are more concerned about adverse health effects of mobile phones and their base stations as other population groups. Furthermore, we wanted to evaluate these concerns in comparison to those expressed for other environmental hazards. In addition, subjects regularly using a mobile phone were compared to those that do not and also age and gender related effects were investigated.

Material and methods

On many occasions of public hearings during or after the planning stage of mobile phone celltowers in Austria, medical doctors of the Institute of Environmental Health, University of Vienna, are invited to give lectures on the scientific background – especially on health effects of high-frequency electromagnetic fields.

Prior to four of these lectures a questionnaire was handed out to the participants asking for their personal ratings of several known or suspected health risks including those of mobile telecommunication. These ratings were done on Likert-type six-point scales ranging from “no risk at all” to “very high risk”. Participants were ascertained that results of the questionnaire would not have any impact on the pending decisions about the celltower. A total of 123 questionnaires was returned amounting to a participation rate of about 48%.

Medical students during their pre-clinical education served as contrast group (n = 366). Only few of them had previously

been confronted with risk concepts or were familiar with the specific topic of risk assessment concerning electromagnetic fields, thus their statements are considered not being influenced by an intimate knowledge about the controversy concerning this issue. Furthermore, due to their young age and education level they were thought to be not *a priori* sceptical about technological innovations.

Comparison between groups were done by Mann-Whitney U tests. Spearman rank correlation coefficients were computed to assess relationship between ratings and age. For all tests a level of significance of 5% was chosen.

Results

Generally, participants of the public lectures and students were very close to each other in their average ratings of health effects of various factors (see Fig. 1). The highest risks were attributed to asbestos exposure, smoking, and living in the vicinity of nuclear power plants.

Interestingly both groups rated the risk from celltowers slightly higher compared to mobile phones. Although no difference between students and participants of the hearings concerning risk perception of most factors were observed, the risk attributed to nuclear power plants, and to mobile phones as well as their base stations was rated significantly higher by the participants (Tab. 1). While students' ratings of mobile phones and cell towers were below, participants ratings were slightly above category 3 “average risk”. This difference is not due to age, sex or using a mobile phone because it persisted in all strata. The per person estimates of the risks of exposures to mobile phones and celltowers

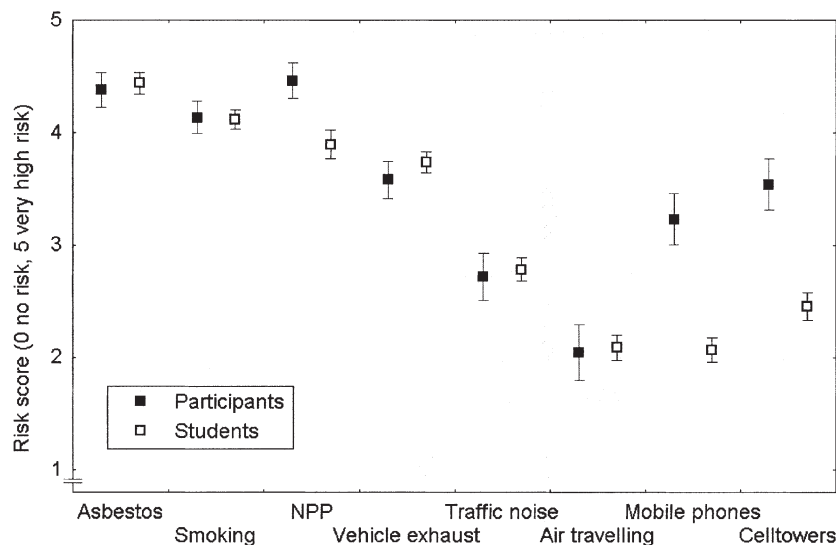


Figure 1 Mean and confidence interval of risk rating for participants in public hearings and the contrast groups of students for different environmental hazards (NPP: Nuclear power plant)

Table 1 Results of statistical comparison between participants and students, males and females, mobile phone users and non-users and correlation between age and ratings concerning health risks attributed to different factors. p-values for Mann-Whitney U tests and Spearman correlations are shown

Ratings of	Participants (n = 123) vs. students (n = 366)	Mobile phone users (n = 378) vs non-users (n = 103)	Males (n = 221) vs. females (n = 268)	Spearman correlation with age	
	p-value	p-value	p-value	R	p-value
Asbestos	0.214	0.306	0.401	0.056	0.226
Smoking	0.954	0.824	0.409	0.052	0.250
NPP ¹	<0.001	0.084	<0.001	0.180	<0.001
Vehicle exhaust	0.120	0.545	<0.001	0.019	0.719
Traffic noise	0.466	0.603	0.039	0.117	0.011
Air travelling	0.404	0.385	<0.001	0.009	0.843
Mobile phones	<0.001	<0.001	0.104	0.340	<0.001
Celltowers	<0.001	0.001	0.078	0.348	<0.001

¹ NPP: Nuclear power plant

correlated well with each other (Spearman $R=0.76$). Users of mobile phones rated the risk of both the mobile and the base station significantly lower (Tab. 1, Fig. 1).

There were significant differences between genders in risk ratings for nuclear power plants, vehicle exhaust, traffic noise, and air travelling but not for mobile phones or cell-towers (although a tendency was noted). In all these instances women rated the risk higher. Low to moderate though significant correlations between age and ratings were found for nuclear power plants, traffic noise, mobile phones, and base stations with higher risk ratings with increasing age.

Discussion

Contrary to the claims of the telecommunication industry (e.g., see www.fmk.at), opponents of celltowers generally do not attribute exceptionally high risks to exposures from mobile phones and their base stations. Only a minority rated these risks as high. However, participants at public hearings had more concerns than the contrast group of medical students. While the latter group had average ratings comparable in magnitude to the risk of air travelling, participants at public hearings had average ratings comparable to health risks from traffic-related air pollution and traffic noise. This underlines that offering information and participation during the planning phase could be effective in reducing exaggerated fears (Hutter et al. 2001b).

Risks that are voluntarily taken by a person and are under her or his direct control (e.g., active smoking) are often rated considerably lower by those taking the risk (Slovic 1987; Bergler 1995; Fischhoff 1995). This was also the case in this study: mobile phone users, whether participants of the hearings or students, rated health risks of mobile phones and celltowers lower than non-users.

Generally, ratings of health risks for most factors investigated showed correlation with age with higher ratings in older subjects. Whether this reflects a more pessimistic attitude with increasing age or a cohort effect cannot be decided. However, correlations were low to moderate and were not confounding the difference seen between participants and students. Women had higher ratings for most factors and particularly for factors that reflect technical achievements (Sjöberg 1998). Only for asbestos and smoking males and females had comparably high ratings.

Differences between ratings of participants in hearings and students as a contrast group were neither due to sex or age but may be attributed to the activation of concerns by lack of control of the situation and the proximity to a source of exposure with unknown features. It can be hypothesized that by a more transparent policy and a credible risk communication strategy the impact of both factors could substantially be reduced.

Acknowledgements

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Zusammenfassung

Risikowahrnehmung von Mobilfunk-Basisstationen und Mobiltelefonen

Fragestellung: Die Diskussion um die Gesundheitsfolgen elektromagnetischer Felder hat zu Ängsten vor Immissionen von Mobilfunk-Basisstationen beigetragen. Diese Studie sollte überprüfen, ob die Nachbarn von Basisstationen stärkere Befürchtungen bezüglich der Gesundheitsgefährdung durch Mobiltelefone und Basisstationen äussern.

Methoden: Im Vorfeld von Vorträgen von Ärzten des Instituts für Umwelthygiene bei öffentlichen Veranstaltungen wurde ein Fragebogen an die Teilnehmer verteilt, der nach der persönlichen Bewertung verschiedener Umweltrisiken einschliesslich solcher der Mobilkommunikation fragte (n=123, Rücklaufquote ca. 48%). Medizinstudenten (n=366) dienten als Kontrastgruppe.

Ergebnisse: Die Teilnehmer schätzten sowohl das Risiko durch Mobiltelefone als auch durch Basisstationen höher ein als die Studenten. Ein Trend zu höherer Risikoeinschätzung zeigte sich auch bei älteren Personen und bei Frauen. Die Risikoeinschätzungen von Mobiltelefon und Basisstation korrelierten gut miteinander. Die Grössenordnung des wahrgenommenen Risikos entsprach anderen allgegenwärtigen Umweltbelastungen wie Verkehrslärm oder Luftverschmutzung.

Schlussfolgerung: Entgegen den Behauptungen der Mobilfunk-Industrie werden von Mobilfunk-Gegnern üblicherweise keine ungewöhnlichen Ängste bezüglich der elektromagnetischen Felder geäussert. Unsere Studie zeigt, dass die Einschätzung anderen in der zivilisierten Welt alltäglichen Risiken vergleichbar ist. Es ist anzunehmen, dass übertriebene Befürchtungen vermieden werden können, wenn der besorgten Bevölkerung Information und Teilnahme am Entscheidungsprozess angeboten werden.

Résumé

Perception du risque des antennes-relais et des téléphones portables

Objectifs: La discussion concernant les effets sanitaires des champs électromagnétiques a contribué aux angoisses vis-à-vis des antennes-relais de la communication mobile. Cette étude devrait vérifier si les riverains des antennes-relais articulent des inquiétudes plus importantes en ce qui concerne le risque de santé provenant des téléphones portables et de leurs antennes-relais.

Méthodes: Un questionnaire a été distribué, au début de conférences publiques réalisées par des médecins de l'Institut d'Hygiène de l'environnement aux participants, demandant la classification personnelle de risques de l'environnement, la téléphonie mobile incluse (n=123, pourcentage du retour env. 48%). Des étudiants en médecine (n=366) servaient de groupe de comparaison.

Résultats: Les participants estimaient le risque provenant des portables ainsi que des antennes-relais comme plus élevé que les étudiants. Une tendance vers une estimation supérieure du risque était également présente chez les personnes plus âgées et les femmes. Les estimations de risque des portables et des antennes-relais étaient bien corrélées. L'ordre de grandeur du risque perçu correspondait cependant à celui d'autres problèmes d'environnement comme le bruit du trafic ou la pollution de l'air.

Conclusion: Contrairement aux affirmations de l'industrie de la communication mobile, les adversaires de la téléphonie mobile ne formulent pas, en général, des inquiétudes inhabituelles en ce qui concerne les champs électromagnétiques. Notre étude montre que l'estimation est comparable à celle des autres risques habituels dans le monde civilisé. Il est à supposer que, si information et participation dans le processus de décision sont proposés aux citoyens soucieux, des angoisses exagérées peuvent être évitées.

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