The application of the precautionary principle to the cellular phone issue: A turn for the better or the worse?[1]

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Abstract

Possible adverse health effects due to electromagnetic fields (EMF) from cellular phones and base stations present a major public health issue across Europe. As scientists cannot exclude that EMF may cause health problems, the application of the precautionary principle is debated heavily. By considering precautionary measures, political decision makers hope to cope with public fears about EMF. Results from an experimental study are presented which indicate that precautionary measures may trigger concerns and amplify EMF-related risk perceptions. Such impacts, questioning common expectations, should be considered in decisions about precautionary measures.

Introduction

The public debate about possible adverse health effects from exposure to electromagnetic fields (EMF) from cellular phones and base stations is one of the risk issues that occupies many political decision makers across Europe (see Burgess, 2004).

Because scientists cannot exclude the possibility that EMF may cause health problems (IEGMP, 2000; NRPB, 2003; SSK, 2001), the application of the precautionary principle is heatedly discussed in many countries. Essentially, the precautionary principle recommends that action should be taken to prevent serious potential harm, regardless of scientific uncertainty as to the likelihood, magnitude, or cause of that harm.

[1] This text is a slightly revised and shortened version of Wiedemann & Schütz (2005): The Precautionary Principle and Risk Perception: Experimental Studies in the EMF Area. *Environmental Health Perspectives* (doi:10.1289/ehp.7538).

By considering precautionary measures, political decision makers hope to cope with these public fears about EMF. Various courses of action are taken into consideration including more research, better risk communication, exposure minimization strategies, and stricter exposure limits. A range of options have been chosen, such as participatory site selection of base stations in the Netherlands, stricter exposure limits in Switzerland, and better risk communication in the UK (public access to data bases revealing the sites and technical features of the base stations), as well as labeling of cellular phones (discussed in Germany) and general exposure reduction measures, just to name a few.

While the theoretical status and rationality of the precautionary principle has been discussed in many papers (EU, 2000; Foster, Vecchia, & Repacholi, 2000) and conferences (Grandjean, Soffritti, Minardi, & Brazier, 2003; Raffensberger & Tickner, 1999; WHO, 2003), there are almost no empirical studies which analyze the impact of precautionary measures.

A number of studies have investigated the impact of risk communication on risk perception (e.g. MacGregor, Slovic, & Morgan, 1994; Morgan et al., 1985; Purchase & Slovic, 1999; Schütz & Wiedemann, 1995). However, to date, no one – at least not to our knowledge – has addressed empirically the question as to whether precautionary measures influence risk perceptions and if so, in which direction. This is astonishing, especially because risk perceptions play a prevalent role in the discussion about the necessity of involving the precautionary principle.

In an experimental study, we investigated the impact of precautionary measures on risk perceptions. Drawing on the current available literature, two opposing hypotheses can be derived: First, precautionary measures will increase trust in risk management, and in turn, increased trust in risk management will be associated with lower risk perceptions. Second, the alternative hypothesis points to the possibility that precautionary measures will be considered as a cue that the risk might be real. Here, perceived risk should be amplified.

As discussed above, the reason for invoking the precautionary principle is scientific uncertainty. Thus it would be of interest to see whether emphasizing the uncertainty in scientific knowledge about EMF risks will affect risk perception.

Method

These questions were investigated in an experimental study using 4×2 factorial design. The first factor was comprised of a basic text and three different precautionary measures (see Table 1). In the “no precaution” condition, only the basic text was presented. In the three “precaution” conditions, the basic text plus one of the descriptions of precautionary measures were provided.

The second factor varied the emphasis of uncertainty. In the “uncertainty” condition, a sentence which pointed to scientific uncertainty about the sufficiency of current protection measures was included in the basic text. In the “no uncertainty” condition, this sentence was missing (see Table 1).

Table 1: Text fragments used in experimental conditions

Experimental condition	Text
Basic text	A widespread debate about the potential risks related to electrosmog is ongoing. Some scientists argue that substantial uncertainties exist as to whether current protection from electrosmog is sufficient.* The International Commission for (Non-Ionising) Radiation Protection points out that current exposure limits protect the public adequately.
Minimization	Nevertheless the Commission recommends precautionary measures: Exposure from mobile phone emission is to be kept as low as possible.
Special protection of sensitive areas	Nevertheless, following a precautionary approach, many local communities demand that base stations should not be sited near sensitive locations such as day care facilities, schools or hospitals.
Precautionary limits	Following a precautionary approach, Switzerland has tightened exposure limits by a factor of ten in areas where people are exposed for long periods of time.

* This sentence was added in the “uncertainty” condition of the 2nd factor

An Austrian ad hoc sample of 246 subjects aged 18 to 81 with a median of 24 years (62% female, 38% male), answered a questionnaire which included one of the eight texts from the experimental conditions. Subjects were randomly assigned to the experimental conditions. Risk perceptions were collected with a 7-point rating scale asking “All in all, how threatened do you feel about electrosmog?” (with 1 labeled “I don’t feel threatened at all” and 7 labeled “I feel very threatened”).

Results

A two-way analysis of variance yielded a statistically significant main effect for the precautionary measures factor ($F_{3,238} = 3.954$; $p = 0.009$) and a statistically insignificant main effect for the uncertainty factor ($F_{1,238} = 0.730$; $p = 0.394$). There was no statistically significant interaction between the two factors ($F_{3,238} = 0.343$; $p = 0.794$). Fig. 1 shows the average ratings for each of the four conditions of the precautionary measures factor. Clearly, the mean for the “no precaution” condition is much lower than the means for the three “precautionary measures”, which in turn are all close together.

A separate analysis by means of a *post hoc* test (Tukey HSD) confirms this visual impression. It is the “no precaution” condition that is statistically different ($p < 0.05$)

from “special protection of sensitive areas” and “precautionary limits,” and marginally statistically different (p = 0.072) from “exposure minimization”. The three “precautionary measures” conditions do not differ significantly from each other.

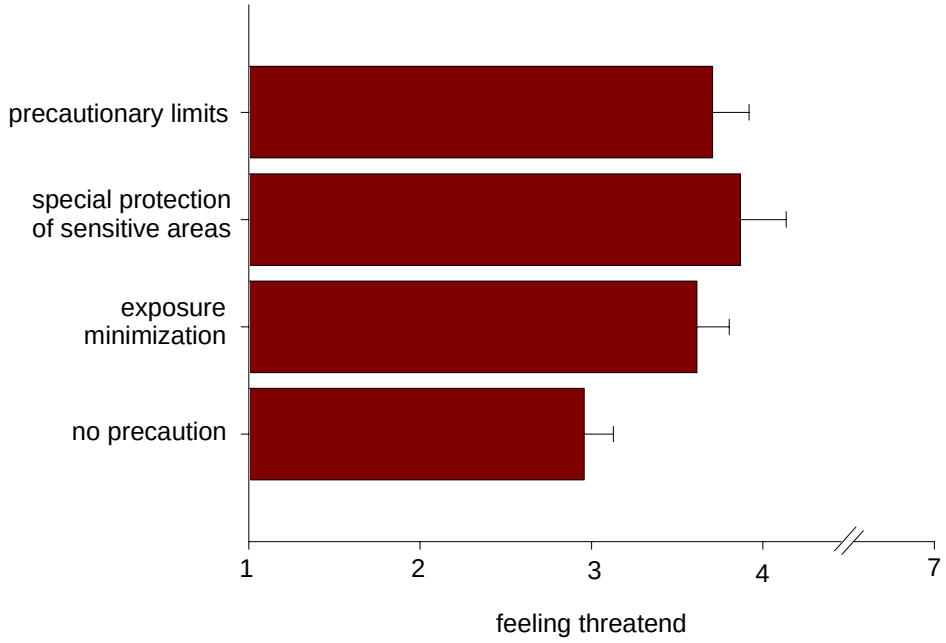

Fig. 1: Mean ratings (and standard errors) for the four “precautionary measures” conditions

Discussion

Precautionary measures implemented with the intention of reassuring the public about EMF risk potentials seem to produce the opposite effect. They may trigger concerns and amplify EMF-related risk perceptions. Referring to the WHO definition of health (“Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”, WHO, 1948), it seems that a precautionary approach to mobile phones and base stations might have adverse effects on health.

Of course, these results need to be confirmed in further experiments before drawing practical conclusions for cautionary policies. These findings also pose a number of questions for further research. For instance, why did the uncertainty condition (i.e. the reference to scientific uncertainty about the sufficiency of current protection measures) have no effect on risk perception (maybe the experimental manipulation was simply not strong enough)? And even more importantly, are there any conditions under which application of precautionary measures will increase trust in risk management, which in turn will result in lower risk perceptions?

Despite the tentative nature of our results, they support the warnings in the WHO-backgrounder on cautionary policies "that such policies be adopted only under the condition that scientific assessments of risk and science-based exposure limits should not be undermined by the adoption of arbitrary cautionary approaches" (WHO, 2000). We tend to add that any precautionary policy should consider possible countervailing risks such as increasing fear and unnecessarily spreading anxieties. These adverse impacts of precaution should be brought to the attention of policy makers.

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