effect measurers are reported [1,2]. When it comes to his critique, we are clearly aware that one can look at the number needed to treat (NNT) from a mathematical point of view, and that a main reason for the difficulties with this measure is that it is defined by inverting a difference. This creates a fundamental instability in the NNT. Our aim, however, is to illustrate the practical implications of this for medical studies in a simple way, and we believe we do this rather clearly.

Regarding Prof Dr Bender's second point, we disagree that relative risk (RR) and NNT are directly comparable. For example, NNT is frequently presented without error measures, such as confidence intervals, whereas this would rarely be the case for the RR. Hence, the instability of NNT can easily be overlooked.

With regard to the third point, we are of course aware of the skewness of the distribution of the RR. However, we think a comparison of histograms is still useful because information can be seen visually in a simple manner.

One important contribution in our article, which is overlooked by Bender, is the demonstration of the use of NNT in published articles. This illustrates the actual practice in this field.

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Increasing health awareness to decreasing nonparticipation bias in health studies

To the Editor:

It was with great interest that I read ''Register-based data indicated nonparticipation bias in a health study among aging people'' by Nummela et al. [1], which addressed the differences in response rates across sociodemographic groups. The authors indicated that in the register-based data, they found participants with a tendency to have lower socioeconomic positions compared with nonparticipants. Poor health outcome is also more common seen in nonparticipants. Besides this observation, health beliefs and/or awareness may also be one of the reasons affecting response rates. Prior studies have shown that lack of health awareness, perception, or knowledge among nonparticipants was observed across public health programs and clinical trials [2−5], as well as nonparticipants, particularly among the elderly, often underestimate, ignore, or deny having high risk of certain diseases. Health beliefs, awareness, perception, or knowledge is actually related to socioeconomic status, including education and income. For primary prevention purpose, we may need to understand if unawareness could bring more influence than socioeconomic positions to avoid participating in health studies because health awareness is directly related to lifestyle behaviors, and lifestyle behaviors are indicators to health outcomes. Constant public education on importance of healthy living and research will then be required.

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Health awareness and associations with nonparticipation bias—a question of faith in life?

In reply:

I would like to thank Ivy Shiue for her thoughtful and constructive comments [1] on our article ''Register-based data indicated nonparticipation bias in a health study among aging people'' published in the *Journal of Clinical Epidemiology*, 2010 [2].

I agree that health beliefs and/or awareness may also affect response rates and may lead to nonparticipation bias in health studies. However, unfortunately, it was not possible to answer this question in our study. Generally, when studying nonparticipation bias in a questionnaire survey, the possibility to use register data may also be a limitation because of strict legislation regarding the privacy and the protection of the anonymity of the participants and nonparticipants. These are, certainly, important questions, but it is unlikely or even impossible that data for this kind of research regarding health awareness can be collected from the registers.

Health awareness and participation activity in health-related studies are undoubtedly crucial issues. As suggested, it has been found that people are more likely to participate if the study has relevance in their lives—for example, if they have particular symptoms [3]. Nevertheless, those who are in relatively good health might not participate [4], and those with poor health might not be able to participate because of reasons such as weakness or illness [2]. This may suggest that an increase in health awareness after one has had an illness is associated with participation activity, and thus those with moderate health (depending on a health indicator) participate more frequently. However, this is not a perfect situation from the viewpoint of prevention.

Overall, nonparticipation in scientific studies has been increasing for several reasons, such as the rise in the number of requests to participate (telemarketing and our ''oversurveyed'' society) and the general decrease in volunteerism, which likely in part coincide with the lack of immediate benefits to the participants. Furthermore, increasingly complicated studies may be burdensome for participants if they do not have a direct relevance to their lives, and growing challenges are faced in finding potential study participants because of lifestyle factors (e.g., reduced free time). Finally, complex characteristics among different socioeconomic groups, such as the greater trust in science and higher volunteerism among higher socioeconomic groups, may modify the participation rates [3]. However, characteristics such as higher trust and volunteerism among higher socioeconomic groups may be related to better confidence in the future, higher optimism, faith in life, and, thus, greater motivation for health promotion and health awareness. Nevertheless, high response rates can reduce the risks of bias, but surveys with low nonresponse rates may also have high relative nonresponse bias [5]. Participation rate alone does not determine the extent of bias [3].

In summary, I appreciate the helpful suggestions by Ivy Shiue and conclude that I am in agreement with her thoughts regarding the need to understand how health unawareness is related to nonparticipation and whether the influence of unawareness on avoiding participation is stronger than that of socioeconomic position.

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