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Effectiveness of a preventive campaign for noise-induced hearing damage in adolescents

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ABSTRACT

Objectives: Many studies have documented a high incidence of hearing loss and tinnitus in adolescents after recreational noise exposure. The prevalence of noise-induced symptoms is in contradiction to the low preventive use of hearing protection. The effects of preventive campaigns on the attitudes toward noise in young people are under debate. The aim of the present study is to investigate whether a preventive campaign can alter attitudes toward noise in adolescents and whether this results in an increase of hearing protection use in this population.
Methods: A cohort of 547 Flemish high school students, aged 14 to 18 years old, completed a questionnaire prior to and after a governmental campaign focusing on the harmful effects of recreational noise and the preventive use of hearing protection. At both occasions the attitudes toward noise and toward hearing protection were assessed by use of the youth attitudes toward noise scale (YANS) and the beliefs about hearing protection and hearing loss (BAHPHL), respectively. These questionnaires fit into the model of the theory of planned behavior which provides a more clear insight into the prediction of a certain behavior and the factors influencing that behavior.
Results: The score on the YANS and the BAHPHL decreased significantly ($p < 0.001$) implying a more negative attitude toward noise and a more positive attitude toward hearing protection. The use of hearing protection increased significantly from 3.6% prior to the campaign to 14.3% ($p = 0.001$) post campaign in students familiar with the campaign.
Conclusions: Measurable alteration of all the variables in the theory of planned behavior caused an increase of the intentions to use hearing protection as well as the actual use of hearing protection. The present study shows the usefulness of the theory of planned behavior to change and guide adolescents' preventive actions toward noise damage. In addition, preventive campaigns can establish attitude and behavioral adjustments. However, the long term effects of preventive campaigns should be investigated in future research.

Introduction

As a consequence of loud music exposure, noise-induced hearing damage in adolescents and young adults increased over the last years [1–3]. Besides measurable hearing loss on the audiogram also other symptoms such as tinnitus, the perception of an auditory phantom sound in the form of ringing, buzzing, roaring or hissing in the absence of an external sound source [4], is a frequently occurring phenomenon in young people after recreational noise exposure. Furthermore, noise-induced tinnitus, can also occur solitarily [5] without the presence of a hearing loss measured by the classical audiometry technique. The fact that up to 30% of outer hair cell loss may occur without any associated detectable hearing loss [6], implicates that the absence of a measurable hearing loss does not exclude cochlear or neural damage and that tinnitus clearly is a sign of overexposure [5,7]. The reported incidence of regularly temporary tinnitus in adolescents due to recreational noise varies between 60% and 85% [8–14]. Moreover, permanent noise-induced tinnitus is already experienced by 10% to 18% of young people [8,9,15]. A large discrepancy between the high prevalence of noise-induced symptoms and the low rate of preventive measures in the form of hearing protection (HP) has been reported several times by previous research [9,16,17]. Whether hearing education programs and campaigns prompt adolescents to display hearing protective

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behavior in noisy situations is under debate. Weichbold and Zorowka found that a hearing protection program yielded limited behavioral changes in high school students going from 0% prior to the campaign to 3.7% HP use one year later [18] and also in subsequent studies the effects of hearing education campaigns are questioned [19,20]. The question is whether providing information and thus increasing the knowledge concerning the risks of loud music exposure, is sufficient to cause behavioral changes in adolescents. The theory of planned behavior (TPB) provides more insight into the prediction of health related behavior considering also other influencing factors besides knowledge. Despite the fact that information accuracy unequivocally plays a huge role [21], the TPB states that the reciprocity between attitudes toward a particular behavior, subjective norms and perceived behavioral control defines the intentions to behave in a certain way. Attitudes are regarded as beliefs about the outcome determined by positive or negative evaluation of self-performance of the particular behavior. A subjective norm is the extent to which an individual's perception about the particular behavior is influenced by significant others (parents, peers, teachers, etc.) weighted by the compliance with such influence. Finally, perceived behavioral control is an individual's belief about the presence of factors that facilitate or impede the performance of the health-related behavior [22,23]. Previous research focused on adolescents' attitudes toward noise by use of the youth attitudes toward noise scale (YANS), a 19-item questionnaire focusing on different aspects of noise [17,24]. A recent study by Widén investigating potential health promotion variables associated with adolescents' HP use at concerts showed that the TPB is also useful in the prediction of hearing protection behavior [25]. The present study reports on the behavioral effects of a Flemish governmental hearing education campaign on adolescents evaluating the effect of changes in attitudes, social norms and perceived behavioral control as explained by the TPB.

Methods

Governmental campaign

On the eve of the festival season of 2011 (May) a governmental preventive campaign (from now on referred to as PrevC) was released in the Flemish part of Belgium (Dutch speaking part) in order to prevent hearing damage caused by noise exposure. The campaign was called 'Iets Minder is de Max' which can be translated as 'Anything less is the max' targeting high school students aged 14 to 18 years old. The campaign was promoted via various ways such as television and radio commercials, social network sites (Facebook/Twitter), posters and a website (www.ietsminderisdemax.be). PrevC had the intention to make young people more aware of the risks of loud music and therefore increase the use of HP in noisy situations and to effectuate a more controlled and responsible use of personal listening devices (PLD's).

Subjects

A cohort of 547 high school students (mean age = 16.8 years old ± 0.8) completed the same questionnaire twice: the first time in March 2011 (prior to the campaign) and the second time in November 2011 (six months after the campaign). The principals of several high schools were contacted by phone with the suggestion to participate in the study. This approach was chosen because this allowed to provide sufficient information concerning the study and to answer all questions. After a positive verbal agreement, all participating schools were sent a written confirmation of participation by e-mail including a copy of the questionnaire. As the study is performed by the administering of a questionnaire, the high school principals were in this case considered as the caretakers of the minors. All questionnaires were administered during class and students had 15 min time to complete the questionnaire. As such, the situation in which the completion of the questionnaire occurred was quite similar for all students and controlled by the teacher which resulted into a very high response rate. Originally, 600 questionnaires were sent to the participating high schools of which 547 (=91%) were analyzed and described in the current paper. 53 questionnaires were not included in the present paper because they were incomplete. Students were not at all obliged to complete the questionnaire so the completion of the questionnaire was considered as a silent approval for participation. As such, an additional informed consent was not documented. The approach of the present study was approved by the IRB of the University Hospital Antwerp in 2011 prior to the administration of the first questionnaire.

Questionnaire content

Questions concerning PrevC

Concerning the familiarity with PrevC following yes–no question was asked: "Have you heard of the campaign PrevC?" In case of a positive answer the students also needed to respond to the question whether one thought that the campaign rendered sufficient information concerning the risks of loud music exposure (yes–no) and whether the campaign incited to more carefully protect the hearing by use of HP (yes–no).

Use of personal listening devices

One was asked to indicate whether one used PLD's. In case of a positive answer, the respondents needed to indicate how much (answer possibilities: daily, weekly, monthly, yearly) and how long (answer possibilities: not applicable, less than 30 min, between 30 min and 1 h, between 1 and 2 h and longer than 2 h) one listened to PLD's on average. Finally the volume settings of PLD's were assessed by use of a percentage scale going from 0% to 100% of the total capacity of the device.

Youth attitudes to noise scale

A validated Dutch version [26] of the Youth Attitudes to Noise Scale (YANS) [27] was included in the questionnaire. The YANS consists of nineteen items considering the following themes: (a) attitudes toward noise associated with elements of youth culture, e.g. attending discos, (b) attitudes toward the ability to concentrate in noisy environments, (c) attitudes to daily noises, e.g. traffic noise and (d) attitudes toward influencing the sound environment, e.g. in school. All items need to be scored on a five-point Likert scale going from 'totally agree' to 'totally disagree'. For a more extensive review on the validation of the Dutch YANS we refer the reader to Appendix A.

Beliefs about hearing protection and hearing loss

The beliefs about hearing protection and hearing loss (BAHPHL) was originally developed by the National Institute for Occupational Safety and Health in order to assess the beliefs concerning hearing protection and hearing loss among industrial workers [28,29]. The original BAHPHL was validated in Dutch [26] in which the items concerning industrial noise were omitted or altered in order to become applicable to adolescents and young adults. Therefore the Dutch version contains 7 items instead of the original 8 (the eight category was omitted): (a) Susceptibility to hearing loss, (b) severity of consequences of hearing loss, (c) benefits of preventive actions, (d) barriers to preventive actions, (e) behavioral intentions, (f) social norms and (g) self-efficacy. For a more extensive review on the validation of the Dutch BAHPHL we refer the reader to Appendix B.