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Behavior change in noise-producing activities – a model

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ABSTRACT

More than 1.2 million people in Switzerland suffer from road traffic noise exceeding the threshold limits. Also many everyday activities are a source of noise. Creating noise and suffering its effects, is the individual. Therefore aside from technical improvement and government policies, a potential for noise reduction is assumed using motivation of the individual for noise reducing behavior.

Because of poor knowledge in annoyance research regarding interventions, a theoretical psychological model was constructed to explain the change of noise-producing behavior. The model is based on a review of the existing theories in the field of general and environmental psychology, and is adapted to the noise topic. Groups of theories reviewed were motivation models, behavioral enaction models and multi-stage models for explaining behavior change. The new 'Change of Noise-Producing Behavior (CNB)' model consists of five stages the individual passes through, from creating a motive to actively cause less noise, to maintain an altered behavior. The model starts with a motivation stage followed by behavior selection stage, behavior planning stage, and behavior implementation stage and ends with the maintenance stage. Within each stage, stage-related processes influenced by different variables occur, which enable transition to the next stage or lead to falling back to the previous one. In a next step, the elements of the model have to be re-examined regarding their suitability and completeness by conduction of empirical research. The validated model will help to increase the overall understanding of individual and social processes related to individual behavior causing noise as a byproduct. With this knowledge future strategies can be developed to motivate noise-reducing behavior.

1. INTRODUCTION

More than 1.2 million people in Switzerland suffer from road traffic noise exceeding the threshold limits. In addition to traffic, many everyday activities are a source of noise. Creating noise and suffering its effects, is the individual. Therefore noise abatement starts – aside from technical improvements and legislation – in the head of each individual. Today the government is already trying to increase awareness of the noise problem by bringing it before the public. The main focus is to inform about extent of noise pollution and health risks from excessive noise stress (knowledge supply). The potential for noise reduction using individual motivation for noise-reducing behavior is most likely not realized – not least because of missing fundamentals. A comprehensive model showing the relevant social and psychological mechanisms in an aggregated form could help to develop a deeper overall understanding of individual and social processes in the field of noise abatement. With this knowledge future strategies could be developed that aim at influencing motivational and cognitive orientation patterns in order to push noise-reducing behavior.

The research program described here consists of two main parts: To build and verify a process structured model and to develop intervention strategies to increase noise-reducing behavior. The program started this year and will go on for several more years. The concept suggested by the Interdisciplinary Centre for General Ecology at the University of Berne consists of several modules, some of them building on the previous module. A process-based model ‘Change of Noise-Producing Behavior (CNB)’ was developed by evaluating and synthesizing the existing information from relevant literature. The model will be explained in this paper.

2. METHOD

The first goal of the present research program is to construct a theoretical psychological model to explain the change of noise-producing behavior. For this reason, a literature research in the field of general and environmental psychology was conducted. Three groups of theories were reviewed. First, motivational models such as the Theory of Planned Behavior [1], the Norm Activation Model [2], the Value-Belief-Norm model [3], the Social Cognitive Theory [4], the Protection Motivation Theory [5], and the Social Psychological Model of Noise Annoyance [6] were examined. These models focus on the behavior intention and assume that intention leads, more or less directly, to the intended behavior.

In the next step, behavioral enaction models such as the Implementation Intention Theory [7] and Goal-Theory [8] were analyzed. In these models, the focus is on the transition from intention to behavior. As a last step, multi-stage models for explaining behavior change were analyzed. The authors of these models focus on behavior change as a process and they also address the fact that individuals show different behaviors and are susceptible to different kinds of information depending on the stage within the behavior change process. The following multistage models were analyzed: the Health Action Approach [9], the Rubicon Model [10], the Transtheoretical Model [11], and the Precaution Adoption Process [12]. A stage model was taken as basis for the new ‘Change of Noise-Producing Behavior (CNB)’ model. The processes that lead from stage to stage were hypothesized based on the insights from previous motivational and behavior enaction models. The new model will be described in the next chapter.

3. RESULTS

The Transtheoretical Model (TTM) [11] was selected as a basis for the new model. The TTM has been developed to explain behavior change in health contexts, and is adapted to the field of noise reduction. It includes most of the stages emphasized by the other multistage models mentioned above.

The well-established and frequently applied Theory of Planned Behavior [1] explains behavior intention by three variables: *attitude*, *social norms*, and *perceived behavioral control*. All three variables influence the behavior selection process, and the variable *social norms* is also involved in the motivation process and in the behavior implementation process. The Norm Activation Model [2] has been developed to explain altruistic behavior by *personal norms*, which in turn are explained by *problem awareness* and *internal attribution*. The variables *problem awareness* and *internal attribution* were assigned to the motivation process and the variable *personal norm* to the behavior selection process. The idea to assign *values* to the motivation process originated from the Value-Belief-Norm model [3] (an extension of the Norm Activation Model), which assumes values to influence the motivation process. Another important theory, the Social Psychological Model of Noise Annoyance [6] uses the perceived disturbance and the perceived control over the noise exposure to explain noise annoyance. Maris et al. [13] refer to this theory and measure the perceived control by varying the influence of the participant on his noise exposure (fair or unfair procedures). In the model *control over the noise exposure*, *noise annoyance*, and *feelings of injustice* were assigned to the motivation process. In addition, the recommendation by Kals et al. [14] and Hinds & Sparks [15] were followed to include emotions in models for explaining environmentally relevant behavior; therefore, *emotions* were included in the behavior selection process, *negative noise-related emotions* in the motivation process, and *affective experiences* in the behavior implementation process. Another important variable is knowledge. Frick et al. [16] distinguish between three types of knowledge, specifically effectiveness knowledge, action-related knowledge, and system knowledge. Therefore *effectiveness knowledge* and *action-related knowledge* were included in the behavior selection process.

Gollwitzer [7] focuses on the process leading from intention to behavior. In his model, the key variable is the implementation intention (i.e., intentions with the structure “when x occurs, I will do y”); thus, when such implementation intentions are present, environmental cues can produce specific behaviors. For this reason, the variable “recognition of windows of opportunities” was included, which is an important environmental cue in the behavior planning process. Finally, the role of habit is important in several of the presented theories, and therefore the variable habit was included in the behavior planning process. Another important theory for the new model is the Protection Motivation Theory [5], which particularly suggested a number of variables that we assigned to the behavior implementation process.

Model stages

The model is divided into the stages an individual passes through according to the theory, from creating a motive to reduce noise, to permanently establishing the new behavior. These stages consist of (in the order as shown): Motivation, behavior selection, behavior planning, behavior implementation and finally behavior maintenance.

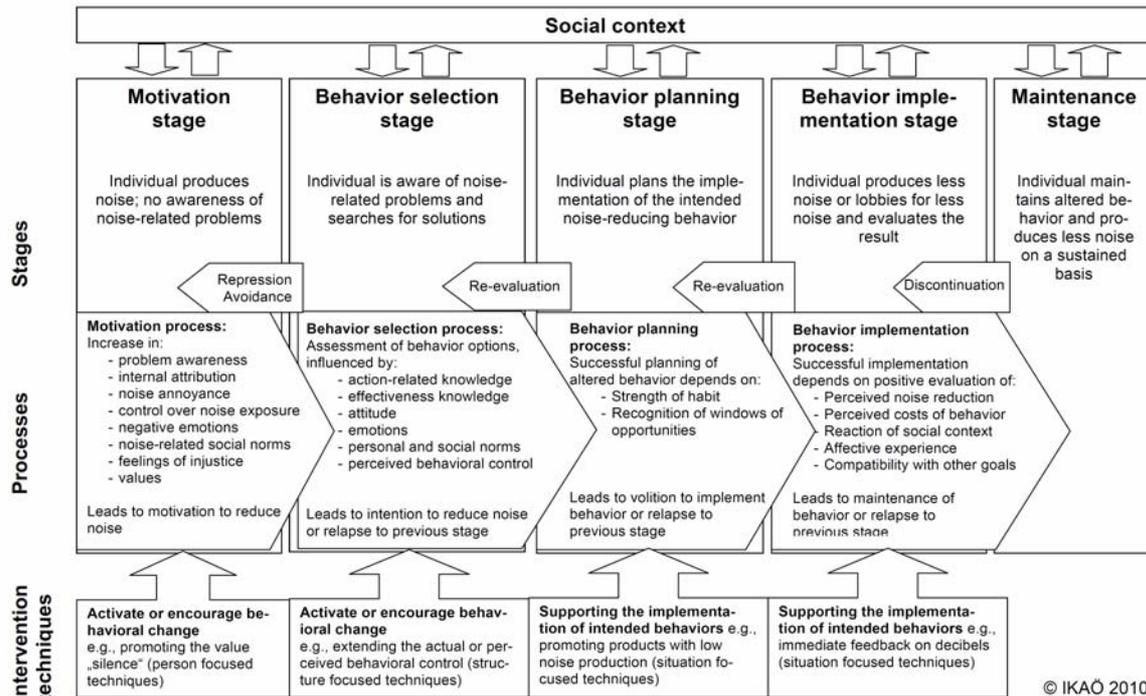


Figure 1. Preliminary model 'Change of Noise-Producing Behavior (CNB)' based on existing theories and models in environmental psychology

In the beginning of the first stage (*Motivation stage*) the individual is hardly at all aware of the problems related to noise. Noise is a byproduct of daily activities, e.g. car driving. Regarding use of noise-reducing measures the individual is acting in a passive way. To move from the first to the second stage (*Behavior selection stage*) the individual has to create a motive to cause less noise. Therefore in stage two the individual has a motive to change behavior. The individual is aware of the problems related to noise and is looking for possibilities to change behavior. Different possibilities of behavior change are checked for actual operability by the individual. If the check is successful, a concrete intent is formed to change a behavior (new behavior, discontinue a behavior, a change in performing the behavior) – the individual is moving on to stage three. In the beginning of the third stage (*Behavior planning stage*) the individual has found a suitable possibility for a change of his or her own behavior. By other means the intention has been created to change a particular behavior. At this stage, an actual planning of the intended behavior takes place. If the actual plan is made, the individual enters stage four (*Behavior implementation stage*) when actual performing takes place. The performing with the intent to cause less noise is first on a trial basis coupled with an evaluation of the new behavior. If the result of the evaluation is positive the individual passes on to the last stage (*Maintenance stage*) which means the altered behavior will be maintained.

From each stage a fall back into the previous one is possible. Falling back is likely to happen when the process in a particular stage was leading either to no result or a negative result.

Processes for moving between stages - factors of influence

Within a stage, processes occur which enable transition to the next stage. The model shows the variables that play a role in the processes related to the different stages. Each individual variable can have an impact as well as grouped variables.

For stage one the significant variables are problem awareness, e.g. to know that noise can have harmful effects on the physical as well as the psychological well-being. Furthermore these harmful effects have to be considered as a problem. Another variable in this stage is internal attribution to the individual: If the individual feels responsible for noise related problems, this can encourage moving on to the behavior selection stage. The exposure to noise as well as control over the exposure situation, e.g. being able to go to another quieter room in a house also influences the process of finding a motive. Further variables include negative emotions related to noise, social norms, sense of injustice and the acknowledgment of quietness as a value - all of which influence the process of forming motives to reduce noise.

For a successful passage through the second stage (behavior selection stage) the following factors of influence can be identified: First of all the individual has to know about actual behaviors to reduce noise (action-related knowledge, effectiveness knowledge). A major influence comes from the view of the individual regarding an actual behavior, e.g. a dislike of using public transport can have a negative impact on the recognition of this particular action as practicable behavior (attitude). Important variables at this stage are personal and social norms, emotions towards noise reducing behavior, as well as the perception of freedom of action. After successfully having passed the second stage, meaning that a particular behavior was chosen, the individual moves on to stage three where the concrete planning of the chosen action takes place. At this third stage (behavior planning stage) strength of habit has an inhibiting impact, especially with repeated and automated behavior. Recognizing and using favorable occasions, e.g. when moving to a new location, can be conducive to decision making and behavioral change. Thus *recognition of windows of opportunities* is a further variable.

Finally in stage four (Behavior implementation stage) the actual realization of a noise reducing action takes place on an experimental basis. To actually stay with the changed behavior the evaluation of the action must be positive. Major variables at this stage are: the perception of a noise reduction, and positive emotions. Additional positive effect comes from the compatibility of the chosen behavior with other personal goals. The effective costs (financial, time) have to be considered bearable. Furthermore the result of the evaluation is influenced by the reactions of the social milieu.

4. OUTLOOK

In the next step, the elements of the model have to be checked and probably adapted regarding their suitability and completeness, by conducting empirical research. Also the variables have to be weighted and correlations between variables have to be identified. With the help of the validated model, new findings regarding motives for noise-reducing behavior will then be possible. These findings will contribute to close a gap in the annoyance research regarding interventions. Based on these new findings and the model, actual measures for each stage can be developed to promote the transition to the next stage. By implementing the actual measures the government can make an important contribution to encourage noise-reducing behaviors by individuals.

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