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Assessment of Smoking Behaviors in the Home and Their Influence on Children's Passive Smoking: Development of a Questionnaire

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PURPOSE: To construct and validate a questionnaire aiming to measure children's exposure to environmental tobacco smoke (ETS) in the home.
METHODS: The development of the instrument included epidemiological studies, qualitative interviews, pilot studies, and validation with biomarkers and is described in seven consecutive steps. Parents of preschool children, from different population-based samples in south-east Sweden, have participated in the studies.
RESULTS: Content and face validity was tested by an expert panel and core elements for the purpose of the instrument identified. Reliability was shown with test-retest of the first version. The validation with biomarkers indicated that the sensitivity of the instrument was high enough to discriminate between children's ETS exposure levels. Cotinine/creatinine levels were related to parents' described smoking behaviors. Differences were shown between children from non-smoking homes, and all groups with smoking parents, independent of their smoking behavior ($p < 0.01$), as well as between parents smoking strictly outdoors and parents reporting indoor smoking ($p < 0.001$).
CONCLUSION: The results indicate that the presented instrument can be used to discriminate between different levels of ETS exposure and when children's level of tobacco smoke exposure is to be assessed.
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KEY WORDS: Cotinine, ETS, Parents, Outdoor Smoking.

INTRODUCTION

Children's exposure to environmental tobacco smoke (ETS) is a well-known public health problem (1). Though smoking among adults has decreased in the eighties and nineties in Western countries, the World Health Organization (WHO) estimates around 700 million, or almost half, of the children in the world, to be exposed to ETS, mostly in their homes (1).

Legal interventions have decreased ETS exposure in society (2) and changed societal norms have influenced smoking and smoking behavior, primarily in public arenas and work places. Though the social acceptance of ETS in the home has also been influenced and most parents are aware of the importance of protecting their children from tobacco smoke, children's ETS exposure mainly takes place in their homes (1, 3, 4). Parents use different strategies to limit their children's ETS exposure, which means that for estimating children's ETS exposure, type and frequency, as well as the effectiveness, of the precautions used must be considered (5, 6). Earlier studies have shown which strategies parents usually adopt in order to avoid children being exposed to ETS (6, 7). Common strategies were smoking outdoors with the door closed and smoking near an open door or the kitchen fan.

Cotinine, a metabolite of nicotine, has been regarded as the best available objective measure of ETS exposure (1, 8). It has been shown to be highly predictive of adverse health outcomes among children (9, 10) as well as reported ETS exposure (11–13).

We have found scarce knowledge in the scientific literature concerning the effectiveness of specific strategies commonly used by smoking parents in the home to protect children from ETS. In this study, the process of developing and validating an instrument measuring children's ETS exposure in the home is described.

METHODS AND PARTICIPANTS

The construction of the questionnaire was done in seven consecutive steps (Fig. 1). Participants were different samples of smoking and non-smoking adults living in south-east Sweden.

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Selected Abbreviations and Acronyms

ABIS = All Babies in South-east Sweden
CCR = cotinine/creatinine ratio
CHC = child health clinic
CI = confidence interval
ETS = environmental tobacco smoke
LLQ = lowest level of quantification
OR = odds ratio
rs = Spearman correlation coefficient

Step1: Description of Smoking Prevalence and Common Precautions among Parents

A study surveying smoking and smoking behavior among parents of 12- to 24-month-old children was performed (6).

Step 2: Description of Attitudes to, and Opinions of, Protecting Children from Tobacco Smoke

A qualitative study with 11 semi-structured interviews with smoking parents (20–39 years old) of children aged 2 months to 6 years was performed (14).

Step 3: Construction of a Questionnaire—A First Draft

Core elements, according to Jarvis (9), for the instrument were identified as follows: number of smokers in the household; cigarette consumption in the home on weekdays and weekends; and if consumption level or smoking location had been changed. Further, how often and which strategies for ETS protection had been used; how important it was considered by the smokers to smoke in different places; and how often the child was exposed to ETS outside the home. The items were scrutinized and commented on by experts on tobacco issues and questionnaire making, by the members of the project group, and by some smokers.

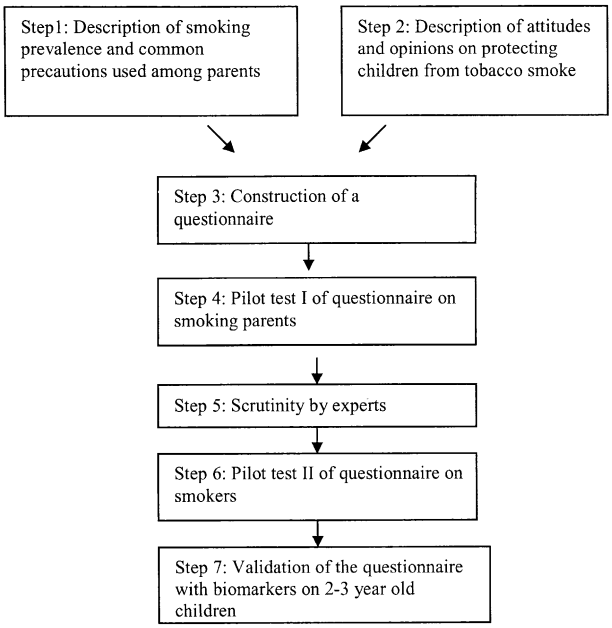

FIGURE 1. Flow chart on instrument development.

Step 4: Pilot Test I of Questionnaire on Smoking Parents

Nurses at eight Child Health Clinics (CHC) situated in urban and rural areas in south-east Sweden were asked to send the instrument to smoking parents. The parents had to be Swedish speaking and not included in the All Babies in South-east Sweden (ABIS) Study because this sample was to be used in a later phase (15). The nurses were asked to return unused questionnaires. Ninety-two questionnaires were sent to CHC nurses who agreed to assist; 13 were returned due to lack of parents fulfilling inclusion criteria. The questionnaire thus reached 79 families, and 43% responded. Mean age was 33 years (range, 27–48) and all had at least one child under the age of 5. Parents' education varied between 9 years compulsory school and university graduates, with a mean of 11 years in school. Both women (79%) and men had filled in the form. Since the questionnaires were sent out by nurses at CHC and the receivers were thus anonymous to us, we have no knowledge on the drop-outs.

The CHC nurses were asked to send two questionnaires at intervals of 2 weeks to each family for test-retest analysis. The contents of the two batches were identical except for complementary questions on age, educational level, number and age of the children, and room for comments on the questions in the first batch. The respondents were asked to return the questionnaires marked with an icon to make it possible to match their two answers.

Thirty-one parents, 91% of the respondents of the first batch, answered the second. The request to mark the questionnaires with a self-chosen icon had been overlooked by half of the parents, thus test-retest was analyzed for the 15 respondents whose questionnaires could be matched. This group did not differ from the whole sample (n = 34) according to sex, age, number of children, or education.

Step 5: Scrutiny of the Questionnaire and Test Results

The questionnaire and the results from the pilot test I were analyzed and shortcomings were identified. "Home-milieu" was obviously an ambiguous perception, since some included outdoors and some did not. This was clarified when "with home-milieu we mean both indoors and outdoors on the balcony, terrace, patio, etc.'" was added. The combined section with both frequency and importance for different behaviors was difficult to understand and was divided into two sections.

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