



How baby's first shot determines the development of maternal attitudes towards vaccination



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ABSTRACT

Background: The attitude towards vaccination is a major determinant of vaccination behavior; this also includes parents' attitudes towards the immunization of their child. Negative attitudes have been associated with vaccine hesitancy and outbreaks of infectious diseases throughout the globe. This study aimed to assess how and why attitudes become more pro-vaccine or vaccine-skeptical over time, and which sources are especially influential in this process.

Methods: Prospective cohort study with measurements at time of recruitment during pregnancy and at +3, +6 and +14 months after childbirth with cross-sectional control groups. In total, 351 women entered the longitudinal analyses, while 204, 215 and 173 women were recruited in the cross-sectional control groups, respectively. Inclusion criteria were: (i) being at least 18 years of age, (ii) pregnant, (iii) primigravida, and (iv) living in Germany.

Results: During pregnancy mothers reported rather positive prior experiences with vaccinations. However, their judgment turned significantly more negative after the first vaccination experience with their child. Mixed-effects models showed that these changes were significantly related to increased risk perceptions and concerns about vaccination, which then had a negative impact on the vaccination attitude. In contrast, gaining more vaccine-related knowledge over time positively influenced attitude formation.

Conclusions: During the first year of their child's life maternal attitudes towards vaccination are formed and guide future decisions whether to vaccinate or not vaccinate a child. Strategies should be implemented that improve mothers' experiences when their newborn is vaccinated to prevent the development of vaccine hesitancy.

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1. Introduction

While vaccination is considered to be one of the major medical achievements with great public health impact, a concerning number of parents are vaccine hesitant globally [1]. It is estimated that less than 5–10% of individuals have strong anti-vaccination convictions, but a more significant proportion could be categorized as being vaccine hesitant [1].

Vaccine hesitancy has been defined as a “delay in acceptance or refusal of vaccination despite availability of vaccination services” [2]. A number of models have been proposed that describe vaccine hesitancy on varying levels of resolution [3]. On the meso-level, individual and social influences, contextual influences, as well as vaccine- and vaccination-specific issues play a role [2]. The macro-

level model describes vaccine hesitancy as a function of complacency, inconvenience of vaccine delivery, a lack of confidence in vaccines and the system that delivers them [2], and too much calculation in the process of information searching [4]. On the micro-level, the Theory of Planned Behavior (TPB) describes vaccination behavior as a function of the behavioral intention to get vaccinated [5]. The intention results from the attitude towards the behavior, perceived behavioral control, and the subjective norm. Previous research has shown that the attitude towards vaccination is a major predictor of vaccination behavior [3,6]. Additionally, attitude is central to all models of vaccine hesitancy listed above: attitude counts as an individual influence in the meso-level approach, and it is a basic factor in explaining confidence in vaccination in the macro-level model and a primary determinant in the micro-level model of vaccine hesitancy [4]. Scales that measure vaccine hesitancy often assess attitudes towards vaccination (such as the Parent Attitudes About Childhood Vaccine Scale [7]) and have

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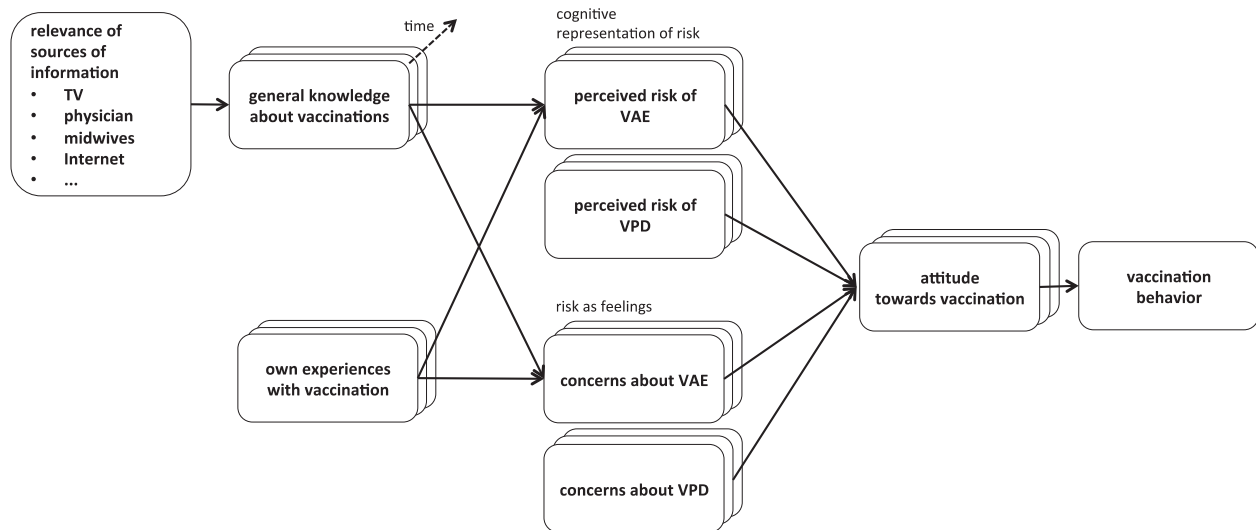


Fig. 1. Conceptual model: The development of the attitude towards vaccination is a function of behavioral beliefs, measured as vaccine-related knowledge and risk perceptions. Note: VAE = vaccine-adverse events, VPD = vaccine-preventable disease.

demonstrated the importance of attitudes in vaccine decision making.

Recognizing the importance of attitudes, the American Academy of Arts & Sciences recommended in their research agenda on “Public Trust in Vaccines” that longitudinal studies should be conducted to assess when and how attitudes and beliefs about immunization are formed, how parents learn about vaccines, and how they are influenced by messages from expert and non-expert sources [8]. We implemented a study to address these research questions; in particular, we were interested to investigate the formation of maternal attitudes towards vaccination over time and to identify relevant determinants of the observed changes. Psychologically, the attitude towards certain behavior (eg, vaccination) is determined by behavioral beliefs of whether performing the behavior is related to positive or negative outcomes, and how likely these outcomes are to occur. This can include concerns and affective aspects [9]. Therefore, in this study we used general knowledge about vaccination as well as risk perceptions as behavioral beliefs to predict changes in the attitude towards vaccination over time. Additionally, psychological work has demonstrated the importance of experience-based knowledge in judging risks [10]. Therefore, this work assessed the importance of participants’ own vaccination-related experiences as conceptualized in Fig. 1.

2. Methods

2.1. Study design

We conducted a nationwide web-based prospective cohort study with initially pregnant women who gave birth over the study period. Data were collected at recruitment during pregnancy, with three follow-up interviews after giving birth until the child turned 14 months. Participants in this longitudinal cohort comprised the main sample in all analyses (see Fig. 2). To identify possible knowledge distortion effects through repeated participation, cross-sectional control groups were set up for each of the three interviews after giving birth. At recruitment, participants filled in the initial online-questionnaire. Subsequently the EFS Survey software randomly assigned each participant to either the longitudinal cohort or to one of the three cross-sectional control cohorts. In addition to the recruitment interview, those belonging to the longitudinal group were surveyed at +3, +6, and +14 months after childbirth, whereas women of the control groups were surveyed

only one additional time (either +3, +6, or +14 months after childbirth). Ethical approval was obtained from the Ethics Committee of the Charité, University Medicine Berlin (EA1/010/12).

2.2. Setting

The study was carried out at population level, recruiting women who were living in Germany. In Germany, an independent national immunization technical advisory group recommends vaccinations, which are then free of charge. Usually general practitioners provide vaccinations for adults and the pediatrician for children. There are no mandates; all vaccinations are voluntary. The timing of the follow-up interviews was harmonized according to the national vaccination schedule at the time of the study. At the age of 3 months, the first two vaccine doses of the hexavalent (tetanus, diphtheria, pertussis, Haemophilus influenzae type b, poliomyelitis, hepatitis B) and pneumococcal vaccine should have been given; at the age of 6 months another dose of these two vaccines; and at age 14 months a booster-dose of hexavalent and pneumococcal vaccines, as well as meningococcal C vaccine and the first measles, mumps, rubella (MMR) and varicella vaccine doses should have been administered (total of 11 vaccine doses, if MMR and varicella are given as separate doses) [11]. Data collection took place between February 2012 and August 2014 with recruitment interviews being performed between February and August 2012.

2.3. Recruitment of participants and incentives

The number of required study participants was determined by a power calculation with the goal to detect possible differences in influenza vaccination coverage among pregnant women as described elsewhere [12]. Accordingly, 300 women were planned for the longitudinal group, 200 for each cross-sectional group. We considered a possible drop-out of approximately 30% leading to 1200 pregnant women to be recruited. Recruitment took place via different health and lifestyle websites targeting pregnant women and parents.¹ Inclusion criteria for both study groups were:

¹ Among others: www.eltern.de, www.sparbaby.de, www.baby-care.de, www.babyclub.de, www.netmoms.de, www.babyforum.de, www.gofeminin.de, www.9-monate.de, www.kidsgo.de, www.impfbrief.de, www.frauenaezrte-im-netz.de, the German Association of Lactation Consultants, German Society of Pediatrics and Adolescent Medicine, the Federal Centre for Health Education.

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