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The structural relations between trait reactance, trust in physicians, vaccine attitudes, and vaccine hesitancy

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Abstract

Vaccine hesitancy has consistently been associated with negative attitudes to vaccines and with distrust in healthcare personnel. Moreover, negative vaccine attitudes have been associated with distrust in healthcare personnel and just recently with the personality trait *reactance*. Yet no study has examined the structural relations between these factors. In this study, the relations between trait reactance, trust in physicians, vaccine attitudes, and vaccine hesitancy were examined using Structural Equation Modeling (SEM) with two models, one for childhood vaccines and one for influenza vaccines. These models were applied to a cross-sectional survey of 770 Finnish parents of children under the age of four and a half years. The results showed that parents with high trait reactance were indirectly more likely to be vaccine hesitant, and that this relation was mediated by less trust in physicians and negative vaccine attitudes in both the childhood vaccine model and the influenza vaccine model. Higher trait reactance was associated with less trust in physicians in both models and with negative vaccine attitudes in the influenza vaccine model. More trust in physicians was associated with positive vaccine attitudes in both models and associated with a lower likelihood of vaccine hesitancy in the childhood vaccine model. Surprisingly, in the influenza vaccine model, more trust in physicians was associated with a higher likelihood of vaccine hesitancy. Finally, positive vaccine attitudes were associated with a lower likelihood of vaccine hesitancy in both models. Future research is encouraged in understanding and countering reactance, since it may play an important role in patients' vaccine-related decision making.

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Svenskt abstrakt

Vaccinmotstånd har konsekvent påvisats korrelera med negativa attityder till vaccin och med bristande tillit till sjukvårdspersonal. Dessutom har negativa vaccinattityder påvisats ha ett samband med bristande tillit till sjukvårdspersonal och först nyligen påvisats ha ett samband med personlighetsdraget *reaktans*. Trots detta har ingen studerat de strukturella relationerna mellan dessa faktorer. I denna studie undersöktes sambandet mellan personlighetsdraget reaktans, tillit till läkare, vaccinattityder och vaccinmotstånd med hjälp av strukturell ekvationsmodellering (SEM) med två modeller, en modell för barnvaccin och en modell för influensavaccin. Dessa modeller applicerades på tvärsnittsenkätdata med 770 finländska föräldrar till barn under fyra och ett halvt år. Resultaten visade att föräldrar med högre reaktans var indirekt oftare vaccinmotståndare och att denna relation medierades av mindre tillit till läkare och negativa vaccinattityder i både barnvaccinmodellen och influensavaccinmodellen. Större tillit till läkare var associerat med positiva vaccinattityder i båda modellerna och med mindre vaccinmotstånd i barnvaccinmodellen. I influensavaccinmodellen var större tillit till läkare något överraskande associerat med mer vaccinmotstånd. Slutligen korrelerade positiva vaccinattityder med mindre vaccinmotstånd i båda modellerna. Framtida forskning för att bättre förstå och motarbeta reaktans uppmuntras, eftersom reaktans kan spela en viktig roll i hur patienter fattar vaccinationsrelaterade beslut.

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Introduction

Vaccine Hesitancy

Vaccination has been considered as one of the greatest achievements for public health in the 20th century. According to estimates, vaccines prevent between two to three million deaths annually (WHO, 2019), and according to the Centers for Disease Control and Prevention (CDC, 2019), vaccinations against the flu prevented an estimated six million flu illnesses and 91,000 flu hospitalizations between 2017 and 2018 in the United States alone. Still, rejection of vaccines for other than medical reasons has started to become more common in recent years (Larson, de Figueiredo, Karafillakis, & Rawal, 2018). This phenomenon has been labeled *vaccine hesitancy*[1], and was defined by the World Health Organization as "a delay in acceptance or refusal of vaccination despite availability of vaccination services" (MacDonald, WHO Strategic Advisory Group of Experts - SAGE 2015). Concerns have been raised regarding the decrease in uptake rates of vaccines, and vaccine hesitancy has even been declared as one of the greatest current threats to global health (WHO, 2019). Vaccine hesitancy has been shown to be a complex phenomenon with various correlates. These correlates range from factors such as vaccine attitudes and trust in physicians to patients' personality traits, to name a few (Brewer, 2017; Browne et al., 2015; Kundi et al. 2015; Mills et al., 2012).

Vaccine Attitudes

One of the strongest predictors of vaccine hesitancy or vaccine endorsement is an individual's attitudes to vaccines (Betsch et al., 2015; Betsch et al., 2018). These include beliefs about the benefits and safety of vaccines, but also the risks, severity and probability of the diseases the vaccines protect against. In a review by Mills et al. (2005), it was found that

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[1] The term vaccine hesitancy has been criticized for being both ambiguous and a catch-all category, instead of a practical concept (Peretti-Watel, 2015). However, it displays the phenomenon as a spectrum between acceptance and refusal of vaccines (Larson et al., 2014) which is a notable strength. It is also the most widely used term in current research literature, and it will therefore be used in this study.

common barriers for childhood vaccination included concerns about the adverse effects of vaccines. Likewise, in a review by Brown et al. (2009), parents were found to behave in accordance with their beliefs about combination childhood vaccines, so that vaccine-declining parents perceived vaccines as unsafe and ineffective, and the diseases as mild and rare, whereas vaccine-accepting parents perceived the same vaccines as beneficial and safe. Similar results were found by Gilkey, McRee et al. (2016), regarding the MMR (measles, mumps & rubella), varicella, and influenza vaccines. They found that low confidence in the vaccines was associated with delaying or refusing vaccinations.

Trust in Physicians

Trust in healthcare professionals, such as physicians, has been associated with both less vaccine hesitancy and more positive attitudes to vaccines, although the results, regarding the association with vaccine hesitancy, are somewhat mixed (Gilkey, McRee, et al., 2016; Gilkey, Reiter et al., 2016; Kundi et al., 2015). In a study by Kundi et al. (2015), trust in physicians was found to predict acceptance of the recommended vaccinations. Similarly, Gilkey, McRee, et al. (2016) showed that distrust in vaccine providers was associated with refusal of MMR and varicella vaccines. However, Gilkey, Reiter et al. (2016) found no association between trust in vaccine providers and vaccine refusal. When it comes to the connection between trust in physicians and vaccine attitudes, Kundi et al. (2015) also found that higher trust in physicians and more information about vaccine benefits and risks predicted higher confidence in vaccines.

Trait Reactance

In a recent study by Hornsey, Harris, and Fielding (2018), vaccine hesitancy was associated with the personality trait reactance. Reactance, as described by Brehm (1966), is a motivational force that becomes activated when a person perceives loss of freedom and this in turn results in attempts to regain autonomy in the given situation. The theory also states

that the intensity of reactance will be affected by how many freedoms are affected and how important these freedoms are to the individual (Brehm, 1989). Reactance can be separated into state and trait reactance (Steindl et al., 2015). State reactance refers to the activation of the motivational force, which in turn increases the likelihood that the individual tries to regain their autonomy and resists attempts to restrain their freedom. Trait reactance, in turn, refers to a tendency that predicts how often and strongly the individual experiences state reactance in different settings.

In the context of vaccines, individuals with high trait reactance could view recommendations and interventions from healthcare workers as violations of their autonomy. Previous studies have shown that advice and education from healthcare professionals can backfire, increasing vaccine hesitancy instead of reducing it (Nyhan et al., 2014; Nyhan & Reiter, 2015). Fogarty (1997) suggested that non-compliance in patients could partly be explained by the theory of reactance. This notion was later supported by a study where state reactance was shown to affect whether patients followed their physician's advice or not (Graybar et al., 1989). Trait reactance has also been shown to predict adherence to treatment (Cuevas, Penate & Sanz, 2014). Cuevas, Penate & Sanz (2014) found that people with higher trait reactance commonly resisted guidance and assistance. As mentioned earlier, it was only recently that the theory of reactance was applied for studying vaccine hesitancy, and the results showed that individuals with higher trait reactance were more likely to have negative attitudes to vaccines (Hornsey, Harris & Fielding; 2018). Studying reactance in the context of vaccines is important, since reactance may affect how individuals respond to vaccine-related recommendations (Betsch et al. 2015).

Aims and Hypotheses

The present study will investigate if there is an association between trait reactance and vaccine hesitancy by examining the structural relations between trait reactance, trust in

physicians, vaccine attitudes, and vaccine hesitancy using structural equation modeling (SEM), which, to the best of my knowledge, has not been done prior to this study. This study will extend on previous research (Hornsey, Harris & Fielding; 2018) that has shown an association between trait reactance and negative vaccine attitudes by investigating whether vaccine attitudes and trust in physicians mediate the hypothesised relation between trait reactance and vaccine hesitancy. Thus, based on previous research (Betsch et al., 2015; Betsch et al., 2018; Brown et al., 2009; Cuevas, Penate & Sanz, 2014; Gilkey, McRee et al., 2016; Gilkey, Reiter et al., 2016; Hornsey, Harris & Fielding, 2018; Kundi et al., 2015; Mills et al., 2005; Nyhan et al., 2014; Nyhan & Reiter, 2015), it is hypothesised that vaccine hesitant individuals will be 1) more likely to have negative vaccine attitudes, and 2) less likely to trust physicians. Additionally, it is hypothesised that 3) individuals who report more trust in physicians will be more likely to have positive vaccine attitudes, and that 4) the negative relation between vaccine hesitancy and trust in physicians is mediated by vaccine attitudes. Concerning reactance, it is hypothesised that individuals with higher trait reactance will be 5) more likely to have negative vaccine attitudes, and 6) more likely to distrust physicians, and that there is a positive relation between trait reactance and vaccine hesitancy that is 7) mediated by trust in physicians, 8) mediated by vaccine attitudes, and 9) mediated both by trust in physicians and vaccine attitudes. The hypotheses will be tested concerning childhood vaccines (the vaccines included in the national vaccination programme for children under the age of six years) and influenza vaccines.

Method

Participants

An invitation to participate in the survey was sent to 3,401 Finnish parents who are participating in the Finnbrain Birth Cohort Study (for information on the cohort, see Karlsson et al., 2017). Altogether, 834 parents responded to the survey. Parents who reported that they

had rejected vaccines for medical reasons or who had not given their informed consent were excluded from the data. This resulted in a final sample of 770 parents and a response rate of 22.6%. The sample consisted of both mothers ($n = 500$, 64.9%) and fathers ($n = 270$, 35.1%) of children under the age of four and a half years. This age group was chosen because parents of older children were soon going to receive another comprehensive questionnaire. The mean age in this sample was 36.4 years ($SD = 4.9$ years, range = 22-61) and the sample consisted of both Finnish speaking ($n = 648$, 84.2%), and Swedish speaking (n = 122, 15.8%) Finns.

Procedure

The participants received an invitation per mail, at the end of May 2018 (week 22). The invitation included information about the study and that participation was voluntary and could be terminated at any time. The invitation also included a personal code to an electronic questionnaire in either Finnish or Swedish, depending on the participants' preference. Due to a technical error, responses from 448 participants were not registered, and the invitation was resent, in October 2018 (week 42), to these participants and to parents who had not responded to the first invitation. The study was approved by the Ethics Committee of the Hospital District of Southwest Finland.

Measures

An English translation of the complete questionnaire is included in Appendix A. Table 1 presents the measures for childhood vaccine hesitancy, influenza vaccine hesitancy, childhood vaccine attitudes, influenza vaccine attitudes, trust in physicians, and trait reactance. These measures are also described below.

Vaccine Hesitancy

Vaccine hesitancy regarding childhood vaccines was measured with the following three questions: "Have you ever hesitated in letting your child(ren) receive any of the childhood vaccines?", "Have you ever postponed a vaccination for your child(ren) with any

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Table 1

Survey Questions and Statements with Corresponding Item Labels

Topic	Survey statement	Item label
CVac Hesitancy	Have you ever hesitated in letting your child(ren) receive any of the childhood vaccines?	ChildHesitation
	Have you ever postponed a vaccination for your child(ren) with any of the childhood vaccines?	ChildPostponed
	Have you ever refused to let your child(ren) receive any of the childhood vaccines?	ChildRefused
IVac Hesitancy	Did you take the latest influenza vaccine for your child (season 2017-2018)?	FluLatest
CVac Attitudes	Vaccinating healthy children helps to protect others by stopping the spread of disease.	HerdImmunity
	Children need vaccines for diseases that are not common anymore.	Uncommon
	*Vaccines can cause autism.	Autism
	Childhood vaccines are safe.	ChildSafe
	*The risk of side effects outweighs the protective benefits of the childhood vaccines.	ChildSideEffects
	Measles is a very serious disease.	Measles
	*A good hygiene will make measles disappear from society – the vaccine is not necessary.	MeaslesHygiene
	Childhood vaccines are effective in protecting against diseases.	Protection
IVac Attitudes	The influenza vaccines are safe.	FluSafe

	*The risk of side effects outweighs the protective benefits of the influenza vaccines.	FluSideEffects
	*It is not worth getting the influenza vaccine, as the influenza symptoms are not serious.	FluSerious
	*Good hand hygiene and other preventive efforts are enough for avoiding the influenza even without vaccination.	FluHygiene
	The influenza vaccines are effective in preventing the disease.	FluPreventing
Trust	I let doctors make the decisions concerning my health.	DocDecision
	I feel heard when I visit the doctor.	Heard
	I am satisfied with the medical treatment I receive from doctors.	Satisfaction
	I trust doctors' ability to make correct diagnoses.	Diagnosis
	When doctors make medical decisions, they have the patients' best interest in mind.	Selflessness
	*Doctors are too authoritative towards their patients.	Authoritative
Reactance	Item 1	Regulation
	Item 2	Stimulating
	Item 3	Prohibition
	Item 4	Dependence
	Item 5	Advice

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Item 6	FreeDecision
Item 7	Obvious
Item 8	FreeChoice
Item 9	Recommend
Item 10	FreeAct
Item 11	Influence
Item 12	RoleModel
Item 13	Forced
Item 14	Society

Note. * Reverse-scored item. CVac Hesitancy – childhood vaccine hesitancy, IVac Hesitancy – influenza vaccine hesitancy, CVac Attitudes – childhood vaccine attitudes, IVac Attitudes – influenza vaccine attitudes, Trust – trust in physicians, Reactance – trait reactance. The statements regarding trait reactance are copy-righted and are therefore presented as items 1–14 in this table.

of the childhood vaccines?" and "Have you ever refused to let your child(ren) receive any of the childhood vaccines?". The respondents were asked to answer these questions with "yes" (vaccine hesitant) or "no" (not vaccine hesitant).

Influenza vaccine hesitancy was measured with the question "Did you take the latest influenza vaccine for your child (season 2017-2018)?" to which the respondents could answer either "yes" (not vaccine hesitant) or "no" (vaccine hesitant).

Vaccine Attitudes

Childhood vaccine attitudes were assessed with eight statements that the respondents could answer on a Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree), with some statements having reversed polarity. This measurement was developed specifically for this study after reviewing current research literature and consulting experts in the field. Examples of the statements are "Vaccines can cause autism" and "The risk of side effects outweighs the protective benefits of the childhood vaccines".

Influenza vaccine attitudes were assessed with five statements that the respondents could answer on a Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree) also having statements with reversed polarity. This measurement was developed for this study. Examples of the statements are "The influenza vaccines are safe" and "The risk of side effects outweighs the protective benefits of the influenza vaccines".

Trust in Physicians

As a measurement of trust in physicians, six statements were created for this study. The respondents answered these statements on a Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Examples of statements assessing trust in physicians are "I let doctors make the decisions concerning my health" and "When doctors make medical decisions, they have the patients' best interest in mind".

Trait Reactance

The Hong Psychological Reactance Scale (Hong & Page, 1989) was used for measuring trait reactance. The scale originally consisted of 18 items, but later research, investigating the psychometric properties of the scale, has resulted in different best-fitting solutions with varying numbers of items (Brown Yost & Finney, 2017; Bryan & Herrera, 2010; Dillard & Shen, 2005; Hong, 1992; Hong and Faedda, 1996; Jonason, Jonason & Knowles, 2006; Thomas, Donnel & Buboltz, 2001; Waris et al., 2019; Yost, Finney & France, 2011). In the present study, the 14-item version was administered. The respondents answered the statements on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). See Hong & Faedda (1996) for the full scale. A one-factor solution including nine of the 14 administered indicators was chosen for this study, in accordance with Waris et al. (2019), who used the same sample as this study to investigate the factor structure of the scale.

Statistical Analyses

Two models were analysed using SEM, or more precisely, structural regressions (SR). The first model (CVac model) had the outcome measure childhood vaccine hesitancy, and the second (IVac model) had the outcome measure influenza vaccine hesitancy. The childhood vaccine hesitancy variable was created based on the parents' responses to the three statements regarding whether they had hesitated, postponed or rejected childhood vaccines for their child(ren). Answering "yes" on at least one of the statements was considered as vaccine hesitancy. Thus, this variable was coded as a dichotomous variable with parents either being assigned a value of 0 (= hesitant) or 1 (= not hesitant). The influenza vaccine hesitancy variable was based on the parents' responses to the statement concerning whether they had taken the latest influenza vaccine for their child(ren) or not, and the responses were coded as 0 (= hesitant) or 1 (= not hesitant).

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All predictors in the SR models were latent variables. These variables were: 1)

childhood vaccine attitudes (CVac Attitudes; eight indicators), 2) influenza vaccine attitudes

(IVac Attitudes; five indicators), 3) trust in physicians (Trust; six indicators), and 4) trait

reactance (Reactance; 9 indicators). In the CVac model, the outcome measure childhood

vaccine hesitancy was included as an observed variable, which was regressed on the two

latent factors childhood vaccine attitudes and trust in physicians. Further, childhood vaccine

attitudes and trust in physicians were regressed on the latent variable trait reactance. Finally,

the variable childhood vaccine attitudes was regressed on trust in physicians. The IVac model

included the outcome measure influenza vaccine hesitancy as an observed variable, which

was similarly regressed on the latent factors influenza vaccine attitudes and trust in

physicians. Further, influenza vaccine attitudes and trust in physicians were regressed on trait

reactance. Lastly, the variable influenza vaccine attitudes was regressed on trust in

physicians. Confirmatory factor analysis (CFA) was first used to separately investigate the

unidimensionality of all the indicators on their respective factor, whereafter the structural

regressions were included in the analysis.

The lavaan package (version 0.6-3; Rosseel, 2012) in RStudio (Version 1.1.463 – ©

2009-2018 RStudio, Inc.) and R (version 3.6.1; R Core Team, 2019) was used for the

analyses. Both direct and indirect relations were calculated (Cohen & Cohen, 1983, p. 358).

Model fit was evaluated using the comparative fit index (CFI; CFI > 0.95 indicates good fit),

the Tucker-Lewis index (TLI; TLI > 0.95 good fit), the root mean square error approximation

(RMSEA; RMSEA < 0.05 good fit), and the standardized root mean square residual (S-RMR;

S-RMR < 0.08 good fit). Due to the response variables being ordinal, robust WLS (WLSMV)

estimation was used in accordance with the guidelines for SEM with ordinal data (Brown,

2015). Pair-wise deletion was used for missing data.

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Results

Descriptive Results

Regarding childhood vaccines, 202 (26.2%) parents were vaccine hesitant, whereas

378 (49.1%) parents were hesitant of influenza vaccines. Of the childhood vaccine hesitant

parents, 192 (95.0%) reported that they had hesitated letting their child(ren) get vaccinated,

106 (52.5%) reported that they had postponed a vaccination for their child(ren), and 58

(28.7%) reported that they had rejected some childhood vaccine(s) for their child(ren). A

similar analysis of the responses concerning influenza vaccines could not be made because

influenza vaccine hesitancy was measured with only one statement in the present study. Mean

scores and standard deviations for parent responses to the statements regarding vaccine

attitudes, trust in physicians, and trait reactance are presented in Table 2. The amount of

missing responses on each item are presented in Table S1 and Table S2 (see Appendix B).

Main Results

All other factor loadings were significant and above the commonly used threshold of

.30 for standardized loadings, except for the item *Dependence*[2], which had a significant factor

loading of .29. For all factor loadings and factor variances, see Table 3. The results in relation

to the hypotheses are presented in Table 4.

Childhood Vaccine Model

The CVac model (Figure 1) predicting childhood vaccine hesitancy from childhood

vaccine attitudes, trust in physicians, and trait reactance showed good fit: $\chi^2(246) = 556.300$,

CFI = .960, TLI = .956, RMSEA = .041, SRMR = .061.

Childhood vaccine attitudes were directly and significantly related to childhood

vaccine hesitancy ($\beta = .56$, 95% CI [.45, .66], $SE = .06$, $Z = 10.14$, $p < .000$), indicating that

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[2] The observed variable Dependence had a low but significant factor loading, indicating that it is a theoretically distant, yet a valid measurement of trait reactance.

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Table 2

Descriptive Information on the Parents' Vaccine Attitudes, Trust in Physicians, and Trait Reactance

Factor	Item	HoCVac		NHoCVac		HoIVac		NHoIVac	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
CVac Attitudes	HerdImmunity	3.72	0.63	3.92	0.30	3.81	0.50	3.92	0.33
	Uncommon	3.35	0.74	3.71	0.54	3.54	0.66	3.69	0.57
	*Autism	1.78	0.84	1.48	0.67	1.68	0.79	1.44	0.64
	ChildSafe	3.04	0.77	3.71	0.49	3.40	0.71	3.65	0.56
	*ChildSideEffects	1.90	0.84	1.35	0.69	1.62	0.82	1.36	0.69
	Measles	3.41	0.77	3.62	0.61	3.48	0.73	3.65	0.59
	*MeaslesHygiene	1.41	0.70	1.19	0.50	1.30	0.60	1.19	0.51
	Protection	3.50	0.70	3.85	0.38	3.69	0.59	3.81	0.42
IVac Attitudes	FluensaSafe	2.64	0.81	3.34	0.72	2.82	0.84	3.48	0.62
	*FluSideEffects	2.48	0.95	1.74	0.87	2.38	0.94	1.48	0.70
	*FluSerious	2.08	0.76	1.70	0.81	2.15	0.80	1.44	0.64
	*FluHygiene	2.42	0.83	2.12	0.86	2.53	0.82	1.86	0.77
	FluPreventing	2.43	0.73	2.89	0.70	2.54	0.75	3.00	0.65
Trust	DocDecision	2.65	0.77	2.91	0.70	2.80	0.72	2.87	0.73
	Heard	2.98	0.69	3.36	0.67	3.13	0.72	3.39	0.65
	Satisfaction	3.09	0.69	3.45	0.62	3.27	0.68	3.43	0.63
	Diagnosis	2.99	0.64	3.30	0.65	3.11	0.67	3.31	0.64

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	Selflessness	3.12	0.70	3.52	0.64	3.31	0.70	3.52	0.64
	*Authoritative	2.29	0.68	2.03	0.75	2.17	0.74	2.02	0.74
Reactance	Regulation	2.54	1.15	2.43	1.12	2.51	1.11	2.42	1.15
	Stimulating	2.15	1.17	2.28	1.18	2.21	1.18	2.28	1.18
	Prohibition	1.50	0.76	1.54	0.84	1.54	0.81	1.51	0.83
	Dependence	3.56	1.06	3.43	1.13	3.51	1.10	3.42	1.12
	Advice	2.68	1.08	2.50	1.08	2.54	1.12	2.55	1.05
	FreeDecision	2.96	1.11	2.72	1.11	2.87	1.13	2.71	1.09
	Obvious	3.56	1.06	3.59	1.09	3.53	1.10	3.65	1.05
	FreeChoice	3.11	1.12	2.95	1.12	3.04	1.13	2.95	1.11
	Recommend	1.79	0.95	1.56	0.79	1.69	0.89	1.55	0.77
	FreeAct	2.62	1.13	2.55	1.17	2.58	1.16	2.55	1.16
	Influence	3.64	0.93	3.68	0.95	3.75	0.89	3.59	0.99
	RoleModel	2.96	1.10	2.8	1.15	2.9	1.14	2.78	1.12
	Forced	2.37	1.10	2.21	1.06	2.34	1.09	2.17	1.04
	Society	1.86	1.02	1.69	1.00	1.88	1.08	1.59	0.89

Note. * Reverse-scored item. CVac Attitudes – childhood vaccine attitudes, IVac Attitudes – influenza vaccine attitudes, Trust – trust in physicians, Reactance – trait reactance. HoCVac – hesitant of childhood vaccines, NHoCVac – not hesitant of childhood vaccines, HoIVac – hesitant of influenza vaccine, NHoIVac – not hesitant of influenza vaccine. CVac and IVac attitudes scale: 1 (strongly disagree) to 4 (strongly agree); Trust scale: 1 (strongly disagree) to 4 (strongly agree); Reactance scale: 1 (strongly disagree) to 5 (strongly agree)

Table 3

Factor Loadings and Variances from Confirmatory Factor Analysis of the One-Factor Models

Factor	Item	Unstandardized		Standardized		
		Estimate	*SE*	Estimate	*SE*	*R²*
		Factor loadings				
CVac Attitudes	HerdImmunity	1.00	–	0.79	0.04	0.62
	Uncommon	0.90	0.06	0.71	0.03	0.50
	*Autism	0.61	0.06	0.49	0.04	0.24
	ChildSafe	0.98	0.06	0.77	0.03	0.59
	*ChildSideEffects	0.77	0.07	0.61	0.04	0.37
	Measles	0.70	0.07	0.55	0.04	0.30
	*MeaslesHygiene	0.90	0.06	0.71	0.04	0.50
	Protection	1.06	0.06	0.84	0.02	0.71
IVac Attitudes	FluensaSafe	1.00	–	0.86	0.02	0.74
	*FluSideEffects	0.98	0.03	0.84	0.02	0.71
	*FluSerious	0.84	0.03	0.73	0.03	0.53
	*FluHygiene	0.76	0.03	0.66	0.02	0.44
	FluPreventing	0.81	0.03	0.70	0.02	0.49
Trust	DocDecision	1.00	–	0.38	0.04	0.14
	Heard	1.89	0.19	0.72	0.02	0.52
	Satisfaction	2.12	0.21	0.81	0.02	0.66

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	Diagnosis	2.32	0.23	0.89	0.02	0.79
	Selflessness	2.09	0.20	0.80	0.02	0.64
	*Authoritative	1.29	0.15	0.49	0.03	0.24
Reactance	Regulation	1.00	–	0.64	0.03	0.41
	Stimulating	0.79	0.06	0.50	0.03	0.25
	Dependence	0.45	0.06	0.29	0.04	0.08
	FreeDecision	1.00	0.06	0.64	0.03	0.41
	FreeChoice	0.96	0.06	0.61	0.03	0.37
	Recommend	1.12	0.07	0.71	0.03	0.54
	RoleModel	0.87	0.06	0.56	0.03	0.31
	Forced	1.03	0.06	0.65	0.03	0.42
	Society	1.00	0.06	0.63	0.03	0.40

Factor variances

CVac Attitudes	0.62	0.07	1.00	–	–
IVac Attitudes	0.75	0.03	1.00	–	–
Trust	0.15	0.03	1.00	–	–
Reactance	0.40	0.04	1.00	–	–

Note. * Reverse-scored item. CVac Attitudes – childhood vaccine attitudes, IVac Attitudes – influenza vaccine attitudes, Trust – trust in physicians, Reactance – trait reactance. Residual correlations included FluSerious and FluHygiene ($r = .18$, $p < .000$), Heard and Satisfaction ($r = .21$, $p < .000$), and Dependence and FreeDecision ($r = .29$, $p < .000$).

Table 4

Results in Relation to the Hypotheses

Hypothesis		CVac model	IVac model
1)	Vaccine hesitant individuals are more likely to have negative vaccine attitudes	Supported	Supported
2)	Vaccine hesitant individuals are more likely to distrust physicians	Supported	–
3)	Individuals who report more trust in physicians are more likely to have positive vaccine attitudes	Supported	Supported
4)	Vaccine attitudes mediate the negative relation between vaccine hesitancy and trust in physicians	Supported	Supported
5)	Individuals with higher trait reactance are more likely to have negative vaccine attitudes	–	Supported
6)	Individuals with higher trait reactance are more likely to distrust physicians	Supported	Supported
7)	Trust in physicians mediate the positive relation between trait reactance and vaccine hesitancy	Supported	–
8)	Vaccine attitudes mediate the positive relation between trait reactance and vaccine hesitancy	–	Supported
9)	The positive relation between trait reactance and vaccine hesitancy is mediated both by trust in physicians and vaccine attitudes	Supported	Supported

Note. "Supported" refers to the hypothesis being supported by the results.

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Figure 1

Childhood vaccine model
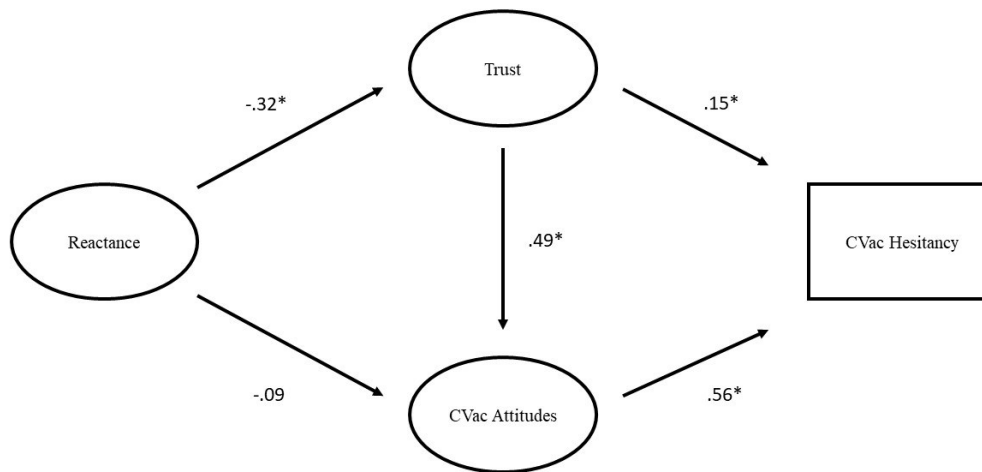
 Note. The path analysis shows associations between trait reactance (Reactance), trust in physicians (Trust),

childhood vaccine attitudes (CVac Attitudes), and childhood vaccine hesitancy (CVac Hesitancy). The

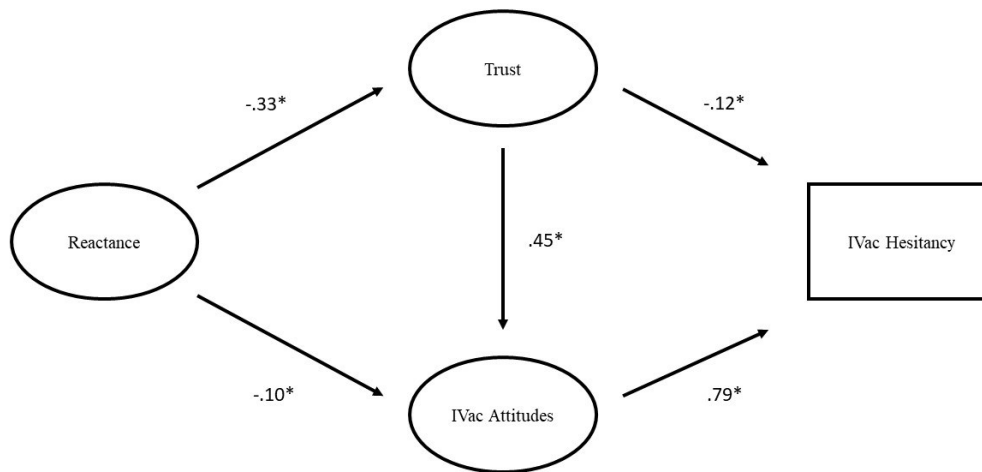coefficients are standardized linear regression coefficients.

* *p* < .05

parents who expressed more positive childhood vaccine attitudes were more likely to have

vaccinated their children. Trust in physicians was significantly associated with both

childhood vaccine hesitancy (β = .15, 95% CI [.03, .27], *SE* = .06, *Z* =2.54, *p* = .011) and

childhood vaccine attitudes (β = .49, 95% CI [.42, .57], *SE* = .04, *Z* = 12.16, *p* < .000),

suggesting that parents who were more trusting of physicians were more likely to have

vaccinated their children and more often reported positive attitudes to childhood vaccines.

Childhood vaccine attitudes mediated the indirect relation between trust in physicians and

childhood vaccine hesitancy (β = .28, 95% CI [.21, .35], *SE* = .04, *Z* = 7.75, *p* < .000),

indicating that parents who trusted physicians more were also more likely to have positive

childhood vaccine attitudes and were less likely to be hesitant of childhood vaccines. Trait

reactance was not significantly related to childhood vaccine attitudes (β = -.09, 95% CI [-.19, .00], *SE* = .05, *Z* = -1.93, *p* = .054), indicating that there was no difference in childhood vaccine attitudes between parents with higher trait reactance and parents with lower trait reactance. Trait reactance was significantly related to trust in physicians (β = -.32, 95% CI [-.41, -.24], *SE* = .04, *Z* = -7.46, *p* < .000), suggesting that parents with higher trait reactance less often trusted physicians. There was a small but significant indirect association between trait reactance and childhood vaccine hesitancy, mediated by trust in physicians (β = -.05, 95% CI [-.09, -.01], *SE* = .02, *Z* = -2.37, *p* = .018), suggesting that parents who reported more trait reactance were less likely to trust physicians, which in turn made them more likely to be childhood vaccine hesitant. However, there was no significant indirect association between trait reactance and childhood vaccine hesitancy through childhood vaccine attitudes (β = -.05, 95% CI [-.11, .010], *SE* = .03, *Z* = -1.87, *p* = .062), suggesting that trait reactance had no effect on childhood vaccine hesitancy mediated solely by childhood vaccine attitudes. Lastly, the indirect association between trait reactance and childhood vaccine hesitancy through trust in physicians and childhood vaccine attitudes was small but significant (β = -.09, 95% CI [-.12, -.06], *SE* = .02, *Z* = -5.10, *p* < .000). Thus, the results indicated that the parents with higher trait reactance less often trusted physicians, subsequently more often held negative childhood vaccine attitudes, resulting in a higher probability of being hesitant about the childhood vaccines.

Influenza Vaccine Model.

The hypothesised IVac model (Figure 2) predicting influenza vaccine hesitancy from influenza vaccine attitudes, trust in physicians, and trait reactance, showed good fit: $\chi^2(182)$ = 389.318, CFI = .979, TLI = .976, RMSEA = .039, SRMR = .048.

Influenza vaccine attitudes were significantly associated with influenza vaccine hesitancy (β = .79, 95% CI [.71, .87], *SE* = .04, *Z* = 19.91, *p* < .000), so that parents who

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Figure 2

Influenza vaccine model

Note. The path analysis shows associations between trait reactance (Reactance), trust in physicians (Trust), influenza vaccine attitudes (IVac Attitudes), and influenza vaccine hesitancy (IVac Hesitancy). The coefficients are standardized linear regression coefficients.

* $p < .05$

expressed more positive influenza vaccine attitudes were less likely to be hesitant of influenza vaccines. Surprisingly, the association between trust in physicians and influenza vaccine hesitancy was negative and statistically significant ($\beta = -.12$, 95% CI [-.22, -.02], *SE* = .05, $Z = -2.31$, $p = .021$), suggesting that more trust in physicians was related to a higher likelihood of influenza vaccine hesitancy. Trust in physicians was significantly related to influenza vaccine attitudes ($\beta = .45$, 95% CI [.37, .53], *SE* = .04, $Z = 10.98$, $p < .000$), meaning that parents who were more trusting of physicians more often reported positive attitudes to influenza vaccines. In line with the hypothesis, influenza vaccine attitudes mediated the indirect relation between trust in physicians and influenza vaccine hesitancy ($\beta = .35$, 95% CI [.28, .43], *SE* = .04, $Z = 9.12$, $p < .000$), indicating that parents who trusted

physicians more were more likely to have positive influenza vaccine attitudes and were therefore less likely to be influenza vaccine hesitant. Trait reactance was significantly related to influenza vaccine attitudes (β = -.10, 95% CI [-.19, -.01], *SE* = .05, *Z* = -2.15, *p* = .031) and to trust in physicians (β = -.33, 95% CI [-.41, -.24], *SE* = .04, *Z* = -7.51, *p* < .000), suggesting that parents with higher trait reactance were more likely to have negative influenza vaccine attitudes and less often trusted physicians than parents with lower trait reactance. Contrary to the hypothesis, trait reactance had a small but statistically significant positive indirect association with influenza vaccine hesitancy through trust in physicians (β = .04, 95% CI [.01, .07], *SE* = .02, *Z* = 2.29, *p* = .022). This effect suggested that parents who reported more trait reactance were less likely to trust physicians, which made them less likely to be influenza vaccine hesitant. In line with the hypothesis, trait reactance had a small but significant negative indirect association with influenza vaccine hesitancy through influenza vaccine attitudes (β = -.08, 95% CI [-.15, -.01], *SE* = .04, *Z* = -2.14, *p* = .032), indicating that parents who reported high trait reactance were more likely to have negative influenza vaccine attitudes and were therefore more likely to be influenza vaccine hesitant. The indirect relation between trait reactance and influenza vaccine hesitancy through trust in physicians and influenza vaccine attitudes was small but significant (β = -.12, 95% CI [-.16, -.07], *SE* = .02, *Z* = -5.41, *p* < .000). The results suggest that the parents with higher trait reactance less often trusted physicians, which made them more likely to have negative influenza vaccine attitudes, and in the end made them more likely to be influenza vaccine hesitant.

Discussion

The aim of the present study was to investigate if trait reactance is related to vaccine hesitancy. Previous research had found an association between higher trait reactance and more negative vaccine attitudes, and associations between trust in physicians, vaccine attitudes, and vaccine hesitancy (Brown et al., 2009; Gilkey, McRee et al., 2016; Hornsey,

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Harris & Fielding, 2018; Kundi et al., 2015; Mills et al., 2005). The present study

hypothesised that individuals with higher trait reactance would be more likely to be vaccine

hesitant, and that this association would be indirect, mediated by trust in physicians and

vaccine attitudes (Hypothesis 9). The results supported this hypothesis, showing a small but

statistically significant indirect association between higher trait reactance and a higher

likelihood of being vaccine hesitant, mediated by less trust in physicians and more negative

vaccine attitudes in both the childhood vaccine model and the influenza vaccine model. Also

in agreement with the hypotheses, individuals with higher trait reactance were indirectly

more likely to be vaccine hesitant, with the association mediated by less positive vaccine

attitudes in the influenza vaccine model (Hypothesis 8), and by less trust in physicians in the

childhood vaccine model (Hypothesis 7). Contrary to these hypotheses (Hypotheses 7 & 8),

higher trait reactance was indirectly associated with a lower likelihood of being vaccine

hesitant in the influenza vaccine model, when mediated by less trust in physicians, and there

was no indirect association between trait reactance and vaccine hesitancy mediated by

vaccine attitudes in the childhood vaccine model.

      Further, higher trait reactance was associated with less trust in physicians in both

models (Hypothesis 6), which has not been demonstrated prior to this study. Higher trait

reactance was also associated with less positive vaccine attitudes in the influenza vaccine

model (Hypothesis 5) in accordance with the hypotheses and earlier findings (Hornsey,

Harris, & Fielding; 2018). There was, however, no significant association between trait

reactance and vaccine attitudes in the childhood vaccine model, contrary to the hypothesis

(Hypothesis 5) and contrary to earlier research (Hornsey, Harris, & Fielding; 2018). The

contradicting result was unlikely caused by differences in the measures, since the measures

used in this study were very similar to that of Hornsey, Harris, and Fieldings (2018).

However, the current sample only consisted of Finnish parents, whereas Hornsey, Harris, and

Fieldings (2018) sample included participants from several countries, which might have affected the results due to the fact that vaccine hesitancy is a complex phenomenon that can be affected by contextual factors (MacDonald, SAGE Working Group on Vaccine Hesitancy, 2015). Also, in contrast to the study by Hornsey, Harris, and Fielding, (2018), the present study controlled for trust in physicians as a mediator when analysing the association between trait reactance and vaccine attitudes. Thus, it is possible that the association between trait reactance and vaccine attitudes was also mediated by trust in physicians in the Hornsey, Harris, and Fieldings (2018) study, possibly explaining the differing result.

As expected, more trust in physicians was indirectly associated with a lower likelihood of vaccine hesitancy, mediated by vaccine attitudes in both models (Hypothesis 4). In agreement with the hypotheses and with earlier research (Gilkey, McRee, et al., 2016; Kundi et al., 2015), more trust in physicians was associated with positive vaccine attitudes in both models (Hypothesis 3), and with a lower likelihood of vaccine hesitancy in the childhood vaccine model (Hypothesis 2). However, and contrary to Hypothesis 2, more trust in physicians was associated with a higher likelihood of vaccine hesitancy in the influenza vaccine model, also relating to the unexpected result regarding Hypothesis 7 in the same model. The unexpected result was likely caused by a *suppression effect*[3], stemming from the influenza vaccine attitudes -variable. To investigate the possibility of a suppression effect, a post hoc analysis exploring the direct relationship between trust in physicians and influenza vaccine hesitancy, without controlling for other factors, was performed in the influenza vaccine model. The results from that analysis showed that the association between trust in physicians and influenza vaccine hesitancy was in the hypothesised direction (Hypothesis 2), so that more trust in physicians was related to a lower likelihood of influenza vaccine

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[3] Suppression may occur in path analyses when the relationship between a predictor and the outcome variable is mediated by two or more mediators with opposite effects. When one of the mediators is controlled for, the effects of the other become more distinguishable (MacKinnon, Krull & Lockwood, 2001)

hesitancy. This finding supports the suppressor hypothesis and could on one hand suggest that the strong relationship between influenza vaccine attitudes and influenza vaccine hesitancy distorts the direct relationship between trust in physicians and influenza vaccine hesitancy in the IVac model. On the other hand, it could suggest that trust in physicians is related to influenza vaccine hesitancy through at least two antagonistic mediators, meaning that more trust in physicians is associated with a lower likelihood of being influenza vaccine hesitant when mediated by influenza vaccine attitudes, but associated with a higher likelihood of being influenza vaccine hesitant when mediated by a yet unknown variable. This unknown variable could hypothetically be fear of disease, since more trust in physicians could result in less fear of diseases, which in turn might increase the likelihood of vaccine hesitancy. Further research is however needed to confirm this hypothesis.

In accordance with previous studies (Betsch et al., 2015; Betsch et al., 2018; Brown et al., 2010; Gilkey et al., 2016; Mills et al., 2005) and in line with the hypothesis (Hypothesis 1), individuals with more positive vaccine attitudes were less likely to be vaccine hesitant in both models. Interestingly, the relation between vaccine attitudes and vaccine hesitancy was stronger in the influenza vaccine model. A possible explanation for this is that vaccine hesitancy and vaccine attitudes were measured with fewer and slightly different questions in the influenza model compared to the childhood vaccine model. Vaccine hesitancy was measured with only one question in the influenza vaccine model (i.e., whether parents had let their child(ren) get the latest influenza vaccine), whereas vaccine hesitancy in the childhood vaccine model was measured with three questions (i.e., whether parents had hesitated, postponed or rejected childhood vaccines). Vaccine attitudes were also measured with fewer questions in the influenza vaccine model. It is therefore unclear if the difference between the associations in the models are due to differences in the phenomena or due to differences in operationalization.

Lastly, and in agreement with previous research (Casey et al., 2016; WHO, 2019), vaccine hesitancy was overall low for childhood vaccines (26.2%), whereas hesitancy regarding influenza vaccines was reasonably high (49.1%). The results also indicated that hesitation regarding childhood vaccines is considerably more common than refusal of childhood vaccines, with approximately 25% of participants reporting having hesitated in letting their child(ren) get some of the childhood vaccines and only an approximate 8% reported that they had rejected a childhood vaccine for their child.

Overall, these results shed more light on the vaccine hesitancy phenomenon. Furthermore, the current findings regarding trait reactance might prove useful for healthcare providers that plan and implement vaccine interventions, since trait reactance could be an underlying cause why some patients distrust and reject vaccines or vaccine-related information when these are presented by authorities such as physicians. However, the association between trait reactance and vaccine hesitancy was small which does indicate that there are several other factors involved in patients' vaccine-related decisions.

Limitations

The present study is not without its limitations, which should be taken into consideration when interpreting the results. First, the sample consisted of Finnish parents, which might limit the generalizability of the results to other countries. Second, the parents were also participating in a medical study. Hence it is possible that trust in physicians is higher in this sample than in the average population. Third, the response-rate was also rather low, which makes this study vulnerable to response bias. Fourth, the study was conducted with a self-report questionnaire. This means that the common disadvantages of questionnaire-based research, such as issues with memory when answering questions on past events, individual interpretations of questions, and desirability bias also apply here. Fifth, the validated measure for trait reactance (Hong's Psychological Reactance Scale) has given

mixed results regarding its dimensionality. Different models have been suggested, depending on the number of items and depending on the sample. However, a one-factor model was used in this study based on a comprehensive analysis of the factor structure in the current sample (Waris et al., 2019). Sixth, it is worth noting that the measures for trust in physicians and vaccine attitudes have not been validated. However, the face validity of the items was considered high by professionals, and measurement error was handled by using factor analysis. Seventh, the data used was cross-sectional, which restricts conclusions of causality. However, by face value it seems likely that vaccine attitudes, trust in physicians, and trait reactance affect vaccine hesitancy and not the contrary.

Conclusions

This study has offered new and exciting results to the ever-growing field of vaccine hesitancy -research by being the first to demonstrate an indirect association between higher trait reactance and a higher likelihood of vaccine hesitancy, and further suggesting that this relation is mediated by less trust in physicians and negative vaccine attitudes. This study has also shed more light on the relationship between trust in physicians and vaccine hesitancy, indicating that the association is mainly mediated through vaccine attitudes.

Future research is encouraged in understanding how trait reactance could be managed when giving patients information on vaccines, since being reactant might play a role in patients' vaccine-related decision making.

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SVENSK SAMMANFATTNING – SWEDISH SUMMARY

De strukturella relationerna mellan personlighetsdraget reaktans, tillit till läkare, vaccinattityder och vaccinmotstånd

Inledning

Vaccinmotstånd

Vaccin räknas till en av 1900-talets främsta framgångar för den allmänna hälsan. Enligt vissa uppskattningar förhindras årligen omkring två till tre miljoner dödsfall tack vare vaccin (WHO, 2019), och enligt Centers for Disease Control and Preventions (CDC, 2019) estimat förhindrade vaccinationer kring sex miljoner fall av influensasmitta och 97 000 influensarelaterade inläggningar på sjukhus mellan åren 2017 och 2018. Dock har det blivit allt vanligare att inte ta vaccin av skäl som inte är medicinska (Larson, de Figueiredo, Karafillakis & Rawal, 2018). Fenomenet har getts termen vaccinmotstånd (engelska: vaccine hesitancy), som Världshälsoorganisationen definierar som motvillighet eller vägran att vaccinera trots tillgänglighet av vaccin (MacDonald, WHO Strategic Advisory Group of Experts - SAGE 2015). De sjunkande vaccinationsfrekvenserna är oroväckande och vaccinmotstånd räknas till ett av de största hoten mot global hälsa (WHO, 2019). Vaccinmotstånd har påvisats vara ett komplext fenomen med flera korrelat. Dessa korrelat är exempelvis vaccinattityder, tillit till läkare och patienters personlighetsdrag (Brewer, 2017; Mills m.fl., 2012; Kundi m.fl. 2015; Browne m.fl., 2015).

Vaccinattityder

En av de starkaste prediktorerna för vaccinationsmotstånd är individens attityder till vaccin (Betsch m.fl., 2015; Betsch m.fl., 2018). Dessa attityder kan innefatta tankar gällande riskerna hos vaccinen men också allvarlighetsgraden och riskerna gällande sjukdomarna. Miller m.fl. (2005) fann att oro för negativa vaccineffekter var en vanligt förekommande orsak till vaccinmotstånd. I en litteraturöversikt av Brown m.fl. (2009) påvisades föräldrar

handla i enlighet med sina attityder gällande kombinationsvaccin för barn. Föräldrar som

nekat vaccination uppfattade vaccinen som farliga och ineffektiva samt sjukdomarna som

lindriga och sällsynta. Däremot upplevde föräldrar som godkänt vaccination att vaccinen var

nödvändiga och säkra. Gilkey, McRee m.fl. (2016) fann liknande resultat gällande MPR-,

vattkopps- och influensavaccin. Resultaten visade att tillit till vaccinen hade ett negativt

samband med försening i eller vägran av vaccination.

Tillit till läkare

Tillit till sjukvårdspersonal, såsom läkare, har associerats med både mindre

vaccinmotstånd och mer positiva attityder till vaccin, även om resultaten gällande

vaccinmotstånd inte är enhetliga (Gilkey, McRee, m.fl., 2016; Gilkey, Reiter m.fl., 2016;

Kundi m.fl., 2015). I en studie av Kundi m.fl. (2015) fann man att tillit till läkare predicerade

godkännande av rekommenderade vaccinationer. Gilkey, McRee m.fl. (2016) fann liknande

resultat i deras studie där misstro mot vaccinutdelande instanser associerades med vägran av

MPR- och vattkoppsvaccin. Däremot fann Gilkey, Reiter m.fl. (2016) ingen association

mellan tillit till vaccinutdelande instanser och vaccinationsvägran. Beträffande tillit till läkare

och vaccinattityder påvisade Kundi m.fl. (2015) dessutom att större tillit till läkare och mer

information om nyttan och riskerna av vaccin predicerade större tillit till vaccin.

Personlighetsdraget reaktans

I en färsk studie av Hornsey, Harris och Fielding (2018) påvisades ett samband

mellan vaccinmotstånd och personlighetsdraget reaktans. Reaktans beskrevs av Brehm

(1966) som en motiverande kraft som aktiveras när en individ upplever sig förlora sin frihet,

vilket i tur leder till försök från individen att återta sin autonomi i situationen. Teorin hävdar

också att intensiteten av reaktansen påverkas av hur många friheter som påverkas och hur

viktiga dessa friheter är för individen. Reaktans kan uppdelas i reaktans som ett tillstånd och i

reaktansdrag (Steindl m.fl., 2015). Reaktans i form av ett tillstånd hänvisar till aktiveringen

av den motiverande kraften som ökar sannolikheten för att individen kommer att försöka

återta sin autonomi och motstå andras försök att begränsa individens frihet. Reaktansdrag

syftar till en allmän tendens som förutsäger hur ofta och hur starkt individen upplever

reaktans i olika situationer.

Individer med starka reaktansdrag kunde möjligen uppleva rekommendationer och

interventioner från sjukvårdspersonal som inskränkning av deras autonomi. Tidigare studier

har dessutom visat att råd och utbildning från sjukvårdspersonal, i stället för att minska

vaccinmotståndet, kan ha en motsatt effekt och tvärtom öka motståndet (Nyhan m.fl., 2014;

Nyhan & Reiter, 2015). Fogarty (1997) föreslog att motsträvighet hos patienter delvis kunde

förklaras av reaktansteorin. Detta förslag har senare fått stöd från en studie, där

tillståndsreaktans påvisades påverka huruvida patienterna följde läkarens råd eller inte

(Graybar m.fl., 1989). Reaktansdraget påvisades också predicera följsamheten till behandling

(Cuevas, Penate & Sanz; 2014). Cuevas, Penate & Sanz (2014) fann alltså att individer med

starkare reaktansdrag oftare motsatte sig rådgivning och hjälp. Som redan tidigare nämnts var

det först nyligen som teorin om reaktans tillämpades i forskning om vaccinationsmotstånd,

och resultaten visade att sannolikheten för negativa vaccinattityder var större hos individer

med starkare reaktansdrag (Hornsey, Harris & Fielding; 2018). Reaktansforskning i samband

med vaccin är sålunda viktigt, eftersom reaktansdragen kan påverka hur individer reagerar på

vaccinrelaterade rekommendationer (Betsch m.fl. 2015).

Mål och hypoteser

Denna studie kommer att utforska huruvida det finns ett samband mellan reaktansdrag

och vaccinmotstånd genom att undersöka de strukturella relationerna mellan reaktansdrag,

tillit till läkare, vaccinattityder och vaccinmotstånd med hjälp av strukturell

ekvationsmodellering (SEM). Enligt min vetskap har detta inte gjorts tidigare. Denna studie

kommer att bygga vidare på tidigare forskning som visat ett samband mellan reaktansdrag

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och negativa vaccinattityder genom att undersöka huruvida vaccinattityder och tillit till läkare medierar den antagna relationen mellan reaktansdrag och vaccinmotstånd. Utgående från tidigare forskning är hypoteserna att vaccinmotståndare 1) mer sannolikt har negativa vaccinattityder och 2) mindre sannolikt litar på läkare. Dessutom är antagandet att 3) individer som rapporterar större tillit till läkare mer sannolikt har positiva vaccinattityder och att 4) det negativa sambandet mellan vaccinmotstånd och tillit till läkare medieras av vaccinattityder. När det gäller reaktansdrag är hypoteserna att individer med starkare reaktansdrag 5) mer sannolikt har negativa vaccinattityder och 6) mindre sannolikt litar på läkare, samt att sambandet mellan reaktansdrag och vaccinmotstånd medieras av 7) tillit till läkare, 8) vaccinattityder samt 9) både tillit till läkare och vaccinattityder. Hypoteserna kommer att testas för både barnvaccin (vaccin i det nationella vaccinationsprogrammet för barn under sex år) och influensavaccin.

Metod

Deltagare

En inbjudan till en enkätundersökning skickades till 3 401 finländska föräldrar som deltar i Finnbrains födelsekohortstudie (för mer information om kohorten, se Karlsson m.fl., 2017). Frågeformuläret besvarades av totalt 834 föräldrar och av dessa hade 770 gett sitt samtycke. Detta resulterade i en svarsfrekvens på 22,6 %. Samplet bestod av både mammor ($n = 500$; 64,9 %) och pappor ($n = 270$; 35,1 %) till barn under fyra och ett halvt år. Denna åldersgrupp valdes, eftersom föräldrarna till äldre barn snart skulle få ett annat omfattande frågeformulär. Medelåldern var 36,4 (SD = 4,9; variationsområde = 22–61) och samplet bestod av både finskspråkiga ($n = 648$; 84,2 %) och svenskspråkiga ($n = 122$; 15,8 %) finländska föräldrar.

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Procedur

Deltagarna fick en inbjudan per e-post i slutet av maj 2018 (vecka 22). Inbjudan innehöll information om studien och om att deltagandet var frivilligt och kunde avslutas när som helst. Inbjudan innehöll också en personlig kod till ett elektroniskt frågeformulär på antingen finska eller svenska beroende på deltagarens preferens. På grund av ett tekniskt fel registrerades inte 448 deltagares svar. En ny inbjudan skickades i oktober 2018 (vecka 42) både till de oregistrerade deltagarna och till deltagare som inte svarat på den första inbjudan. Studien godkändes av den etiska kommittén för Sydvästra Finlands sjukvårdsdistrikt.

Mått

Vaccinmotstånd

Vaccinmotståndet gällande barnvaccin mättes med tre frågor: " Har du någonsin tvekat att låta ditt/dina barn få något av barnvaccinen?", Har du någonsin skjutit upp beslutet att låta ditt/dina barn få något av barnvaccinen?" och " Har du någonsin nekat till att låta ditt barn få något av barnvaccinen?". Deltagarna kunde svara på frågorna "ja" (vaccinmotståndare) eller "nej" (inte vaccinmotståndare). Vaccinmotstånd gällande influensavaccin mättes med frågan "Lät du ditt/dina barn få det senaste influensavaccinet?" på vilken deltagarna kunde svara antingen "ja" (vaccinmotståndare) eller "nej" (inte vaccinmotståndare).

Vaccinattityder

Barnvaccinattityder mättes med åtta påståenden som deltagarna kunde besvara på en Likertskala från 1 (helt av annan åsikt) till 4 (helt av samma åsikt). Några påståenden hade omvänd polarisering. Detta mått hade utvecklats specifikt för denna studie efter genomgång av relevant litteratur och konsultation med experter inom ämnet. Exempel på påståenden är: "Vaccin kan förorsaka autism" och "Risken för bieffekter väger mer än nyttan av barnvaccinen".

Influensavaccinattityder mättes med fem påståenden som deltagarna kunde besvara på en Likertskala 1 (helt av annan åsikt) till 4 (helt av samma åsikt) med några omvänt polariserade påståenden. Detta mått utvecklades på samma sätt som måttet för barnvaccinattityder. Exempel på påståenden är: "Influensavaccinen är trygga att ta" och "Risken för bieffekter väger mer än nyttan av influensavaccinen".

Tillit till läkare

Som mått på tillit till läkare utvecklades sex påståenden för denna studie. Deltagarna svarade på dessa påståenden på en Likertskala från 1 (helt av annan åsikt) till 4 (helt av samma åsikt). Exempel på dessa påståenden är: "Jag lämnar besluten som gäller min hälsa i läkarnas händer" och "När läkare fattar medicinska beslut har de patientens bästa i åtanke".

Personlighetsdraget reaktans

Hongs psykologiska reaktansskala (Hong & Page, 1989) användes för att mäta reaktansdrag. Skalan bestod ursprungligen av 18 påståenden men senare studier har kommit till olika slutsatser gällande vilka påståenden som bör användas (Hong, 1992; Hong and Faedda, 1996; Brown Yost & Finney, 2017; Yost, Finney & France, 2011; Jonason, Bryan & Herrera, 2010; Jonason & Knowles, 2006; Dillard & Shen, 2005; Thomas, Donnel & Buboltz, 2001; Waris, 2019). I denna studie administrerades versionen med 14 påståenden. Deltagarna besvarade påståendena på en Likertskala från 1 (helt av annan åsikt) till 5 (helt av samma åsikt). Se Hong & Faedda (1996) för skalan i sin helhet. I denna studie användes 9 påståenden av 14 med en en-faktormodell i enlighet med Waris m.fl. (opublicerad), som undersökte skalans faktorstruktur i samma finska sampel som användes i denna studie.

Statistiska analyser

Två modeller analyserades med SEM, eller för att vara mer exakt med användning av strukturella regressioner (SR). Den första modellen (CVac-modellen) hade utfallsvariabeln barnvaccinmotstånd. Den andra modellen (IVac-modellen) hade utfallsvariabeln

influensavaccinmotstånd. Variabeln för barnvaccinmotstånd skapades ur föräldrarnas svar på de tre påståendena gällande huruvida de hade tvekat, skjutit upp eller vägrat låta sina barn få barnvaccinet. Minst ett ja-svar på något av påståendena beaktades som vaccinmotstånd. Således kodades denna variabel dikotomt så att föräldrarna antingen kodades som 0 (= vaccinmotståndare) eller 1 (inte vaccinmotståndare). På liknande vis skapades variabeln för influensavaccinmotstånd ur föräldrarnas svar på påståenden gällande huruvida de hade låtit deras barn få det senaste influensavaccinet. Variabeln kodades 0 (= vaccinmotståndare) eller 1 (inte vaccinmotståndare).

Alla prediktorer i SR-modellerna var latenta variabler. Dessa variabler var: 1) barnvaccinattityder (CVac Attitudes; 8 indikatorer), 2) influensavaccinattityder (IVac Attitudes; 5 indikatorer), 3) tillit till läkare (Trust; 6 indikatorer) och 4) reaktansdrag (Reactance; 9 indikatorer). I CVac-modellen inkluderades utfallsvariabelmåttet barnvaccinmotstånd som en observerad variabel som regresserades på de latenta faktorerna CVac Attitudes och Trust. CVac Attitudes och Trust regresserades vidare på Reactance. Slutligen regresserades CVac Attitudes på Trust. I IVac-modellen inkluderades utfallsvariabeln influensavaccinmotstånd som en observerad variabel som på liknande vis regresserades på de latenta faktorerna IVac Attitudes och Trust. Sedan regresserades IVac Attitudes och Trust på Reactance. Slutligen regresserades IVac Attitudes på Trust. Bekräftande faktoranalys (CFA) användes först för att separat undersöka unidimensionaliteten hos indikatorerna för deras respektive faktorer. Därefter inkluderades strukturella regressioner i analysen.

För analyserna användes lavaan-paketet (version 0.6-3; Rosseel, 2012) i RStudio (Version 1.1.463 – © 2009-2018 RStudio, Inc.) och R (version 3.6.1; R Core Team, 2019). Både direkta och indirekta samband beräknades (Cohen & Cohen, 1983, s. 358). Modellens lämplighet (engelska: Model fit) evaluerades utgående från comparative fit index (CFI; CFI >

0.95 lämpligt), Tucker-Lewis index (TLI; TLI > 0.95 lämpligt), root mean square error approximation (RMSEA; RMSEA < 0.05 lämpligt) och standardized root mean square residual (S-RMR; S-RMR < 0.08 lämpligt). På grund av att responsvariablerna var ordinala användes robust WLS-estimering (WLSMV) enligt allmänna riktlinjer för SEM med ordinala data (Brown, 2015). Parvis radering användes för avsaknad data.

Resultat och diskussion

Målet för denna studie var att undersöka huruvida reaktansdrag har ett samband med vaccinmotstånd. I enlighet med hypoteserna var individer med starkare reaktansdrag med större sannolikhet indirekt vaccinmotståndare än individer med svagare reaktansdrag. Detta samband medierades av tillit till läkare och vaccinattityder i både CVac-modellen och IVac-modellen (Hypotes 9).

Det negativa sambandet mellan reaktansdrag och vaccinmotstånd medierades också enskilt av vaccinattityder i IVac-modellen (Hypotes 8) och av tillit till läkare i CVac-modellen (Hypotes 7). I motsatts till hypoteserna (Hypoteserna 7 & 8) fanns det ett indirekt samband mellan starkare reaktansdrag och lägre sannolikhet för vaccinmotstånd i IVac-modellen som enskilt medierades av mindre tillit till läkare och det fanns inget signifikant samband mellan reaktansdrag och vaccinmotstånd som skulle enskilt ha medierats av vaccinattityder i CVac-modellen.

I enlighet med hypoteserna associerades starkare reaktansdrag med mindre tillit till läkare i båda modellerna (Hypotes 6) och med färre positiva attityder i IVac-modellen (Hypotes 5). Inget signifikant samband konstaterades mellan reaktansdrag och vaccinattityder i motsats till tidigare forskning (Hornsey, Harris, & Fielding; 2018). I denna studie kontrollerades den medierande effekten av tillit till läkare då sambandet mellan reaktansdrag och vaccinattityder analyserades. Detta gjordes inte i Hornsey, Harris och Fieldings studie. Det motstridiga resultatet beror förmodligen på att sambandet mellan reaktansdrag och vaccinattityder i

Hornsey, Harris och Fieldings studie också medierades av tillit till läkare men att det inte beaktades i deras analyser.

Som förväntat hade större tillit till läkare ett signifikant indirekt samband med en lägre sannolikhet för vaccinmotstånd och sambandet medierades av vaccinattityder i båda modellerna (Hypotes 4). I enlighet med hypoteserna var större tillit till läkare associerat med mer positiva vaccinattityder i båda modellerna (Hypotes 3) och med lägre sannolikhet för vaccinmotstånd i CVac-modellen (Hypotes 2). I motsats till hypotesen var individer med större tillit till läkare mer sannolikt vaccinmotståndare i IVac-modellen. Detta förklarar dels det negativa sambandet mellan reaktansdrag och vaccinmotstånd som beskrevs tidigare. I enlighet med tidigare studier (Betsch m.fl., 2015; Betsch m.fl., 2018; Brown m.fl., 2010; Gilkey m.fl., 2016; Mills m.fl., 2005) påvisades individer med mer positiva vaccinattityder vara mindre sannolikt vaccinmotståndare i båda modellerna (Hypotes 1). Sambandet var något överraskande starkare i IVac-modellen, vilken delvis kan bero på att vaccinmotstånd var vanligare för influensavaccin än för barnvaccin. En annan möjlig förklaring är att vaccinmotstånd och vaccinattityder hade olika mått. Influensavaccinmotstånd mättes med en fråga gällande huruvida föräldern låtit sitt barn få det senaste influensavaccinet medan barnvaccinmotstånd mättes med tre frågor gällande huruvida föräldern tvekat, skjutit upp eller vägrat barnvaccin för sitt barn. Dessutom baserades måttet för vaccinattityder på färre frågor i IVac-modellen. Således är det oklart huruvida skillnaden mellan modellerna beror på att fenomenen är olika eller på att de använda måtten skilde sig något från varandra. Slutligen, och i linje med tidigare forskning (Casey m.fl., 2016; WHO, 2019), visade resultaten att barnvaccinmotstånd förekom mer sällan (26,2 %) än influensavaccinmotstånd (49,2 %).

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Begränsningar

Vissa begränsningar bör beaktas med tanke på tolkningen av resultaten. Studiens sampel bestod av frivilliga, finländska föräldrar, vilket kan ha betydelse för generaliserbarheten av studien. Studien var dessutom en enkätbaserad tvärsnittsstudie med låg svarsfrekvens, vilket begränsar ställningstaganden beträffande kausala samband och tillförlitligheten av resultaten. Slutligen var flera av måtten inte validerade och måttet för reaktansdrag har fått motstridiga resultat i fråga om dess form och dimensionalitet.

Slutsatser

Denna studie utforskade hypotesen om att reaktansdrag skulle ha ett indirekt samband med vaccinmotstånd som medieras av tillit till läkare och vaccinattityder. Resultaten stödde hypotesen. Individer med starkare reaktansdrag hade mindre tillit till läkare, färre positiva attityder till vaccin och var mer sannolikt vaccinmotståndare. Sambandet var dock svagt och några slutsatser gällande kausalitet kan inte dras på grund av att studien var en tvärsnittsstudie. I enlighet med tidigare studier påvisades reaktansdrag ha ett samband med influensavaccinattityder. Däremot hade reaktansdrag i motsats till tidigare studier inget signifikant samband med barnvaccinattityder. Denna studie föreslår att det senare sambandet medieras huvudsakligen av tillit till läkare, vilket tidigare studier inte tagit i beaktande. Framtida forskning behövs i hur reaktansdrag kunde tas i beaktande vid presentation av vaccinrelaterad information. Reaktansforskning kan visa sig ha betydelse med tanke på program som syftar att förbättra individers tillit till läkare och deras vaccinattityder.

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Appendix A

English translation of study questionnaire

QUESTIONNAIRE 1 – Attitudes to medicine

	Strongly disagree			Strongly agree
1. Medicines do more harm than good	1	2	3	4
2. I leave decisions regarding my health into the doctor's hands	1	2	3	4
3. Medicines are safe	1	2	3	4
4. When I see a medical doctor I feel heard	1	2	3	4
5. Medicines are effective in treating illnesses	1	2	3	4
6. When I see a medical doctor I am satisfied with the care I receive	1	2	3	4

7. I have confidence in the ability of medical doctors to make correct diagnoses	1	2	3	4
8. When doctors make decisions they have the patients best interest in mind	1	2	3	4
9. Modern medicine has improved people's health	1	2	3	4
10. Doctors are too authoritative in their attitude towards patients	1	2	3	4

QUESTIONNAIRE 2 – Other treatments

During the past 12 months, have you used any of the following preparations or treatments for the purpose of maintaining good health or treat an illness?

Please check the box to indicate which ones you have used:

☐ Vitamins and minerals (e.g., A, B, C, D, E, fluorine, iodine, zinc, potassium, calcium, magnesium, sodium)

☐ Probiotics (e.g., lactic acid bacterium)

☐ Fish oil and fatty acids (e.g., omega)

☐ Colloidal silver

☐ Turmeric

☐ Ginger preparations

☐ Health powders (e.g., maca, matcha and chlorella)

☐ Natural products to treat flu

☐ Aloe vera

☐ Kombucha

☐ Raw food

☐ Vegetaria or vegan diet

☐ Gluten-free diet

☐ Lactose-free diet

☐ LCHF-diet (low carb, high fat diet)

☐ 5:2 diet

☐ Mediterranean diet

□ Paleo diet

□ Fasting

□ Mindfulness

□ Meditation

□ Yoga

□ Tai chi

□ Chiropractic

□ Acupuncture

□ Cupping

□ Healing (e.g., distant healing, color healing, sound healing, crystal healing, healing minerals)

□ Prayer and laying on of hands

□ Energy treatment

□ Reiki

□ Rosen method

□ Zone therapy

□ Salt therapy

□ Chakra therapy

□ Homeopathy

□ Traditional Chinese medicine

□ Oil-pulling

□ Ayurveda

□ Detox

QUESTIONNAIRE 3 – Hong Psychological Reactance Scale

See Hong & Faedda (1996) for this questionnaire.

QUESTIONNAIRE 4 – Personality, TIPI

See Gosling, Rentfrow & Swann (2003) for this questionnaire.

QUESTIONNAIRE 5 - Perceived Vulnerability to Disease

See Duncan, Shaller and Mark (2009) for this questionnaire.

QUESTIONNAIRE 6 - Vaccine

Childhood vaccines refer to the vaccines included in the vaccination program in Finland for children six years old and younger. That is rotavirus vaccine, pneumococcal conjugate vaccine (PCV), DTaP-IPV-Hib ("5-in-1") vaccine, MMR vaccine, DtaP-IPV ("4-in-1") vaccine.

Influenza vaccines refer to the seasonal vaccines for influenza.

Please read the statements below and indicate how much you agree with the statements by choosing a number between 1 (*Strongly disagree*) to 4 (*Strongly agree*).

	Strongly disagree			Strongly agree
1. Vaccinating healthy children helps protect others by stopping the spread of disease	1	2	3	4
2. Children need vaccines for diseases that are not common anymore	1	2	3	4
3. It is better to be immunized trough disease than through vaccines	1	2	3	4

4. Vaccines can cause autism

      1   2   3   4

5. If you travel to countries where diseases such as hepatitis A and B, yellow fever, or Japanese encephalitis are common, it is important to take the vaccines that should protect against them.

      1   2   3   4

6. Vaccines contain dangerous quantities of mercury

      1   2   3   4

7. If I have concerns about vaccines they are taken seriously by health care professionals

      1   2   3   4

8. I trust the information I receive from health care professionals about vaccines

      1   2   3   4

9. Doctors would not recommend vaccines that are unsafe

      1   2   3   4

10. Childhood vaccines are safe   1   2   3   4

11. The risk of side effects outweighs any protective benefits of the childhood vaccines

    1   2   3   4

12. Measles is a very serious disease

    1   2   3   4

13. Better hygiene and sanitation will make measles disappear – the vaccine is not necessary

    1   2   3   4

14. Childhood vaccines are effective in preventing disease

    1   2   3   4

15. Influenza vaccines are safe

    1   2   3   4

16. The risk of side effects outweighs any protective benefits of the influenza vaccines

    1   2   3   4

17. It is not worth getting the influenza vaccine as the influenza symptoms are not serious

    1   2   3   4

18. Precaution is enough for preventing the influenza even without vaccination	1	2	3	4
19. Influenza vaccines are effective in preventing disease	1	2	3	4

QUESTIONNAIRE 7 – Vaccine behavior

1) Have you ever hesitated in letting your child(ren) receive any of the **childhood vaccines**?

1. No

2. Yes

2) Have you ever postponed a **childhood vaccination** for your child(ren)?

1. No

2. Yes

3) Have you ever decided not to let your child(ren) receive any of the **childhood vaccines**?

1. No

2. Yes

4) Will you reject vaccination with any of the **childhood vaccines** for your child(ren) in the future?

1. No

2. Yes

3. I don't know

4. My child(ren) already have all the childhood vaccines

5) Please state in the list below on what grounds you have hesitated to vaccinate or postponed/rejected vaccination of you child(ren), or on what grounds you plan to reject vaccination in the future (or don't know). You can mark several alternatives if you wish.

☐   I did not know where you could get the vaccines

- ☐ Lack of time

- ☐ Fear of needles

- ☐ Religious convictions

- ☐ Ethical convictions

- ☐ Other convictions

- ☐ I do/did not think that the vaccine was effective

- ☐ I do/did not think that disease the vaccine is intended for is serious

- ☐ I do/did not think that the vaccine was safe because of its side effects

- ☐ I think/thought that other preventive efforts are more effective

- ☐ I deem/deemed it unlikely that my child will fall ill with the disease the vaccine is intended for as others are vaccinated

- ☐ I have bad experiences of the healthcare

- ☐ I or my child have had bad experiences or physical reactions at previous vaccinations

- ☐ I do/did not know where to get reliable information about vaccines

- ☐ Other reasons, please specify:

6) Where have you received such information that has affected your opinions on childhood vaccines?

☐ Media (e.g., TV news, radio, newspapers, and on the internet)

☐ Personal opinions in for example social media, and blogs

☐ Friends and acquaintances

☐ Individuals within the healthcare

☐ Other person outside my circle of acquaintances

☐ Other source, please specify:

7) Did you take the latest **influenza vaccine** (season 2017-2018)?

1. No

2. Yes

8) Will you take the **influenza vaccine** next season (season 2018-2019)?

1. No

2. Yes

3. I don't know

7) Did you let your child get the **influenza vaccine** latest season (season 2017-2018)?

1. No

2. Yes

8) Will you let your child receive the **influenza vaccine** next season (season 2018-2019)?

1. No

2. Yes

3. I don't know

9) Please state in the list below on what grounds you made the choice not to take the influenza vaccine or on what grounds you are hesitating. You can mark several alternatives if you wish.

□   I did not know where you could get the vaccine

□   Lack of time

□   Fear of needles

□   Religious convictions

□   Ethical convictions

□   Other convictions

□   I do/did not think that the vaccine was effective

□   I do/did not think that influenza is a serious disease

□   I do/did not think that the vaccine was safe because of its side effects

□   I think/thought that other preventive efforts are more effective

□   I deem/deemed it unlikely that I will fall ill with the influenza

□   I have bad experiences of the healthcare

□   I have had bad experiences or physical reactions at previous vaccinations

□   I do/did not know where to get good and reliable information about influenza vaccines

□   Other reasons, please specify:

6) Where have you received such information that has affected your opinions on influenza vaccines?

□ Media (e.g., TV news, radio, newspapers, and on the internet)

□ Personal opinions in for example social media, and blogs

□ Friends and acquaintances

□ Individuals within the healthcare

□ Other person outside my circle of acquaintances

□ Other source, please specify:

QUESTIONNAIRE 8 – Health responsibility

1) Do your child(ren) have two caregivers?

1. Yes

2. No

Free-text comment

2) How is the responsibility concerning decisions regarding your child's health divided in your family?

1. Completely my responsibility

2. To a larger part my responsibility

3. Equally much my and the other caregiver's responsibility

4. To a larger part the other caregiver's responsibility

5. Completely the other caregiver's responsibility

3) Do you and your child's other caregiver discuss decisions that concern your child's health?

1. No

2. Yes, a bit

3. Yes, a lot

4) Do you wish that you and your child's other caregiver would discuss decisions that concern your child's health more?

1. No

2. Yes

Appendix B

Tables S1–S2

Table S1

Amount of Missing Responses Per Item Included in the CVac Model

Variable	*n* missing	% missing
HerdImmunity	11	1.4
Uncommon	15	1.9
Autism	24	3.1
ChildSafe	15	1.9
ChildSideEffects	12	1.6
Measles	18	2.3
MeaslesHygiene	13	1.7
Protection	13	1.7
DocDecision	18	2.3
Heard	18	2.3
Satisfaction	20	2.6
Diagnosis	21	2.7
Selflessness	20	2.6
Authoritative	24	3.1
Regulation	10	1.3
Stimulating	12	1.6
Dependence	12	1.6
FreeDecision	11	1.4
FreeChoice	17	2.2
Recommend	10	1.3
RoleModel	13	1.7
Forced	15	1.9
Society	10	1.3

Note. N respondents = 770/item

Table S2

Amount of Missing Responses Per Item Included in the IVac Model

Variable	*n* missing	% missing
FluensaSafe	21	2.7
FluSideEffects	26	3.4
FluSerious	23	3.0
FluHygiene	20	2.6
FluPreventing	20	2.6
DocDecision	26	3.4
Heard	27	3.5
Satisfaction	27	3.5
Diagnosis	28	3.6
Selflessness	27	3.5
Authoritative	32	4.2
Regulation	17	2.2
Stimulating	20	2.6
Dependence	19	2.5
FreeDecision	19	2.5
FreeChoice	25	3.2
Recommend	18	2.3
RoleModel	21	2.7
Forced	23	3.0
Society	18	2.3

Note. N respondents = 770/item

Otto Mäki

PRESSMEDDELANDE

Relationen mellan reaktans och vaccinmotstånd

Pro gradu-avhandling i psykologi
Fakulteten för humaniora, psykologi och teologi, Åbo Akademi

En pro gradu-avhandling vid Åbo Akademi har visat ett samband mellan personlighetsdraget reaktans och vaccinmotstånd.

Vaccinmotstånd kan vara oftare förekommande bland individer med starkare reaktansdrag, hävdar forskare vid Åbo Akademi. Forskarna frågade deltagarna i studien om deras upplevelser och värden gällande individens autonomi samt deltagarnas tidigare beslut gällande barn- och influensavaccin. Resultaten visade att individer med starkare reaktansdrag var mindre benägna att lita på läkare, hade färre positiva attityder till vaccin och oftare tenderade att vara vaccinmotståndare än individer med svagare reaktansdrag. Studien fann således preliminärt stöd för att reaktans kan bidra till vaccinmotstånd, men ytterligare forskning krävs för att bekräfta resultaten.

Studien baserades på ett elektroniskt frågeformulär som besvarats av sammanlagt 770 deltagare. För att mäta deltagarnas reaktansdrag, tillit till läkare, vaccinattityder och vaccinmotstånd använde forskarna frågor och påståenden som utvecklats i samarbete med experter i syfte att mäta dessa fenomen.

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