

Trust in healthcare professionals, perceived benefit and safety of medicines, and use of CAM
as predictors of vaccine-related behaviour in Finnish parents

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Master's Thesis in Psychology

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Subject: Psychology	
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Abstract: Vaccination is one of the most successful public health measures of all time. Despite the major success of immunization, a growing number of people perceive vaccines as unsafe and unnecessary. The aim of the present study was to investigate whether trust in healthcare professionals, perceived benefit and safety of medicines, and use of complementary and alternative medicine (CAM) predict vaccine-related behaviour in parents to small children. The study was conducted in Finland during a 3-month period, where subsequently 771 parents completed an online questionnaire. The questionnaire measured their trust in healthcare professionals, their beliefs about safety and benefit of medicines in general, and their use of CAM treatments and preparations during the previous 12 months. The parents also reported whether they had hesitated, postponed or rejected any of the vaccines that are part of the national vaccination programme in Finland. The results were analyzed using structural regression models. Trust in healthcare professionals was a significant predictor of vaccination behaviour, where lower levels of trust were associated with a higher degree of hesitation, postponing and rejecting childhood vaccines. Use of both CAM treatments and preparations also significantly predicted vaccination behaviour, which indicates that parents who used more forms of CAM were more likely to report that they had hesitated, postponed or rejected vaccines. However, perceived benefit and safety of medicines did not significantly predict vaccine-related behaviour. The mechanisms behind these relationships are largely unknown, but they point to the need for further research in this area.	
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Sammanfattning: Vaccinering är en av de mest framgångsrika folkhälsoåtgärderna genom tiderna. Trots den stora framgången hos immunisering finns det en växande grupp människor som uppfattar vacciner som osäkra och onödiga. Målet med denna studie var att undersöka huruvida tillit till hälsovårdspersonal, upplevd nytta av och säkerhet hos mediciner, samt användning av alternativ- och komplementärmedicin (CAM) predicerar vaccinrelaterat beteende hos småbarnsföräldrar. Studien genomfördes i Finland under en 3-månaders period, varefter 771 föräldrar besvarade en internetbaserad enkät. Enkäten mätte deras tillit till hälsovårdspersonal, deras tilltro till säkerheten och nyttan hos mediciner generellt, samt deras användning av alternativa behandlingar och preparat under det föregående året. Föräldrarna rapporterade också huruvida de hade tvekat inför, skjutit upp eller helt avfärdat något av de vaccin som ingår i det nationella vaccinationsprogrammet i Finland. Resultaten analyserades med hjälp av strukturella regressionsmodeller. Tillit till hälsovårdspersonal var en signifikant prediktor av vaccinationsbeteende, där lägre nivå av tillit var associerad med en högre nivå av tveksamhet, uppskjutande och avvisande av vacciner. Användning av både alternativa behandlingar och preparat var också signifikanta prediktorer av vaccinbeteende, där föräldrar som använde flera former av CAM rapporterade högre nivå av tveksamhet, uppskjutande och avvisande av vacciner. Upplevd säkerhet och nytta av mediciner generellt kunde däremot inte signifikant predicera vaccinrelaterat beteende. Mekanismerna bakom dessa samband är till stor del okända, men de pekar på behovet av vidare forskning inom detta ämne.	
Nyckelord: vaccin, tveksamhet, komplementärmedicin, alternativ medicin, hälsovårdspersonal	
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Introduction

Vaccination is considered one of the greatest achievements for public health. For instance, during the years 2000–2017, vaccinations against measles prevented an estimated 21.1 million deaths worldwide (World Health Organization, www.who.int). For vaccines to be successful in effectively reducing the prevalence of vaccine-preventable diseases, the vaccine uptake among the public needs to be high. However, the vaccine uptake rates have been challenged by individuals and groups that question, or even refuse, vaccination. In recent research, this phenomenon has been labelled *vaccine hesitancy*. According to the World Health Organization, vaccine hesitancy refers to “a delay in acceptance or refusal of vaccines” (www.who.int). However, there is variation across studies in how vaccine hesitancy has been defined and operationalized. For example, one study defines vaccine hesitancy as merely an attitude towards vaccines, as opposed to a behaviour (Yaquib et al., 2014). Another recent study defines vaccine hesitancy as “the dynamic and challenging period of indecision around accepting a vaccination” (Jarret et al., 2015). Despite varying definitions of vaccine hesitancy, the phenomenon is being increasingly studied, and several factors have now been associated with hesitancy towards vaccines (Larson et al., 2014; Bean & Catania, 2018; Attwell et al., 2018; Brewer et al., 2017). However, the impact of these factors varies across time, place and vaccines (Larson et al., 2014), which makes vaccine hesitancy a complex and diverse issue.

Hesitant attitudes towards vaccines are prevalent in several developed countries (Yaquib et al., 2014). In some European areas the vaccine uptake has decreased, and some vaccine-preventable diseases are on the rise (Larson, de Figueiredo, Karafillakis, & Rawal, 2018). In Finland, where the present study was conducted, the uptake of vaccines included in the national vaccination program is generally high. For instance, according to the National Institute for Health and Welfare in Finland (THL, www.thl.fi), the vaccine coverage for the MMR vaccine is 96.1% in Finnish children born in 2016. In 12 hospital districts, however, the

coverage is below 90%. To achieve an effective herd immunity for measles, the MMR vaccination coverage should be higher than 95%. Although the uptake is high on a national level, there is a risk of non-vaccinated individuals clustering together in small areas, creating disease outbreaks (Fine, Eames, & Heymann, 2011; Jansen et al., 2003). In Finland, vaccinations are free and easily accessible for the public, which makes the motives behind parents rejecting or postponing vaccinations for their children an important subject of research. An increase in vaccine hesitancy in the presence of affordable, safe and easily accessible vaccines points to the need for a better understanding of vaccine-related behaviour in order to reduce vaccine hesitancy and increase vaccine uptake.

One factor that has been related to vaccine hesitancy among parents is distrust in medical authorities (Glanz et al., 2013). In one study, parents reported that they do not believe that the paediatricians provide balanced information about both the benefits and the risks of vaccination (Glanz et al., 2013). Another study found that parents who sought exemption from vaccines were more likely than other parents to report distrust in doctors (Gaudino & Robison, 2012). As it is not always possible for parents to acquire the complete knowledge necessary for making medical decisions, they must rely on healthcare providers to act in the best interest of their child. This trust extends to the broader health systems that the healthcare providers are embedded within. In a recent study by Attwell et al. (2017), parents with a history of vaccine rejection reported the belief that the pharmaceutical industry had a considerable negative influence on vaccination research and on the motives of health professionals, in the sense that the industry was biased by the profit motive and withheld information about risks and inefficacies. Furthermore, vaccine-hesitant individuals often show a distrust in the scientific community by criticizing pro-vaccine studies for being flawed and researchers for having conflicting interests (Kata, 2010).

Another factor that has been linked to both vaccine hesitancy and distrust in medical authorities is the belief in complementary and alternative medicine (CAM; Wardle et al., 2016; Busse, Walji, & Wilson, 2011). CAM consists of a diverse range of practices outside the evidence-based medical paradigm (Tippens, Marsman & Zwickey, 2009). Despite the lack of empirical evidence and endorsement by medical authorities, CAM is popular and widely used. Several studies have shown that a considerable number of practitioners of CAM have a negative view on vaccines (Lee & Kemper, 2002; Russel et al., 2004; Bean & Catania, 2013). Some practitioners even actively advise their patients against immunization with vaccines (Ernst, 2002; Russel et al., 2004). Furthermore, a Swiss study showed that vaccine rejection was significantly more frequent among CAM-users than non-users (Zuzak et al., 2008).

A study of Finnish parents showed that CAM is primarily used as a complement to conventional medicine, not as a replacement (Hämeen-Anttila, 2011). However, the same study also showed that negative attitudes towards medicines in general were more common among CAM users than non-users. Compared to CAM non-users, the parents who used CAM were significantly more likely to report that they try to avoid giving medicines to their child and instead use other means (Hämeen-Anttila, 2011).

In Finland, there is limited research targeting vaccine-related behaviour, and to the extent of our knowledge there is no Finnish study that has investigated any type of variables in order to predict vaccination behaviour. Earlier international research regarding the correlation between CAM use and vaccine hesitancy has rarely investigated an extensive list of CAMs, and the main focus has been on treatments and the practitioners that carry out them. Furthermore, research on possible relationships between vaccine-related behaviour and beliefs about medicines in general is also scarce.

The current study

The aim of the present study was to investigate whether trust in healthcare professionals, perceived safety and benefit of medicines, and use of CAM predicted vaccine-

related behaviour in parents to small children. We focused on vaccine-related behaviour concerning vaccines included in the Finnish national vaccination programme for children up to the age of 6 years (except for the influenza vaccine). These are: the MMR vaccine (against measles, mumps and rubella), the PCV vaccine (against meningitis, pneumonia, sepsis and ear infection), the 5-in-1 vaccine (against diphtheria, tetanus, pertussis, polio and Hib diseases), the chickenpox vaccine, and the rotavirus vaccine.

Method

Ethical statement

The present study received ethical permission from the Ethics Committee of the Hospital District of Southwest Finland.

Participants

The current study is a part of the FinnBrain Birth Cohort Study (www.finnbrain.fi), where families were recruited at maternal welfare clinics between December 2011 and April 2015 in the South-Western Hospital District and the Åland Islands in Finland. All 3401 parents in the FinnBrain sample with children 4.5 years old or younger were invited to participate in the present study.

Subsequently, 771 parents completed the questionnaire, resulting in a response rate of 24.9%. Out of these, 500 respondents (64.9%) were women and 271 respondents (35.1%) were men.

Procedure

In May 2018, 3401 informational letters were sent. Due to technical problems some answers were not registered, and 3101 letters were therefore sent again in October 2018. The participants accessed the survey through a personal link in an invitation email. Initially, the participants were informed that the study was voluntary and that the responses would be connected to the earlier collected data in the FinnBrain Birth Cohort Study. Thereafter, they were notified that the collected data would be handled confidentially and that the results

would be reported at group level. The participants were asked to give their informed consent, and if they chose not to, their responses were excluded from the analysis. The respondents were able to choose whether to complete the survey in Swedish or Finnish (see Appendix A for an English version of the whole survey). The survey remained open for three months.

Measures

The survey questions were developed based on literature review as well as expert advice. Only results from selected parts of the survey will be reported here. These are: 1) beliefs about the *benefits and safety* of medicines in general, 2) *trust* towards healthcare professionals, 3) use of *CAM treatments and preparations*, and 4) *own vaccination behaviour* and reasons for possible hesitancy or postponed/rejected vaccination.

Benefit and safety of medicines. The survey included four statements that targeted beliefs about the benefit and safety of medicines in general (“medicines do more harm than good”, “it is safe to take medicines”, “medicines are effective in treating diseases”, and “medicines have improved peoples' health”). The respondents rated how much they agreed with each statement on a scale from 1 (*fully disagree*) to 4 (*fully agree*).

Trust in healthcare professionals. Six statements concerned trust in healthcare professionals (“I trust doctors' ability to make correct diagnoses”, “I let doctors make the decisions concerning my health”, “I am satisfied with the medical treatment I receive from doctors”, “When doctors make medical decisions, they have the patients' best interest in mind”, “Doctors are too authoritative towards their patients”, and “I feel heard when I visit the doctor”). The parents were asked to rate how much they agreed with each statement on a scale from 1 (*fully disagree*) to 4 (*fully agree*).

Use of CAM. The respondents were presented with a comprehensive list of complementary and alternative medicine and asked to indicate every alternative that they had used in the last year for the purpose of maintaining good health or treating a disease. This list included 1) *preparations* (e.g. probiotics, fish oils, and colloidal silver) and 2) *treatments* (e.g.

mindfulness, acupuncture and healing). This division was made based on how the different forms of alternative medicine are used. The number of alternative medicines used was then summed for each respondent. Some of the alternatives, such as a lactose free diet, were excluded, since the reasons behind choosing them likely do not reflect a genuine belief in alternative medicine (i.e. eating a lactose free diet is probably a consequence of lactose intolerance).

Own vaccination behaviour. The survey included three questions on whether the parents had let their children be vaccinated with the childhood vaccines (“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 of the childhood vaccines?”, and “have you ever decided not to let your child(ren) receive any of the childhood vaccines?”). If the respondent answered “yes” to any of the three questions, they were asked to indicate all the reasons for this from a list of possible reasons to their hesitancy or decision to reject or postpone the vaccinations. They could also choose to write a reason that was not included in the list. The three above-mentioned questions were recoded into one ordinal variable, that was encoded as: 0 if the parent had not hesitated, postponed or rejected vaccines; 1 if they had hesitated, but not postponed or rejected vaccines; 2 if they had postponed but not rejected vaccines; and 3 if they had rejected one or more vaccines. If the respondents reported that the reason for the hesitancy, or postponing or rejecting vaccination was medical contraindications, their response was excluded from the analysis.

Results

Descriptive Results

After eliminating cases where medical contraindications for vaccination were present, 26.2% of the respondents had hesitated, postponed or rejected vaccination for their children. The most commonly reported reason for this was the belief that vaccines are not safe due to their side effects, which was reported by 35.1% of the parents who had hesitated, postponed

or rejected vaccines. Other common reasons were beliefs that the vaccine-preventable diseases are not serious (28.2%), beliefs that the vaccines are not effective (11.9%), and negative physical reactions to earlier vaccinations (13.9%).

In total, 77.4% of the respondents had used one or more forms of CAM in the last twelve months. The most commonly used form of CAM was probiotics, which 57.3% of the respondents reported to have used in the last year. Other common forms of CAM were fish liver oil and fatty acids (35.4% of the respondents), natural products for flu (16.0%), and ginger (14.3%). A complete overview of the responses to CAM use can be found in Table 1.

Table 2 shows an overview of the responses to the survey questions on the believed benefit and safety of medicines, as well as trust in healthcare professionals.

Table 1

Use of CAM Treatments and Preparations in the Previous Twelve Months

CAM	<i>n</i>	%
Preparations		
Probiotics	442	57.33
Fish liver oil and fatty acids	273	35.41
Colloidal silver	3	0.39
Turmeric	72	9.34
Ginger	110	14.27
Health powder	51	6.61
Natural products for flu	123	15.95
Aloe vera	83	10.77
Kombucha	22	2.85

Homeopathy	15	1.95
Oil pulling	8	1.04
Treatments		
Mindfulness	71	9.21
Meditation	39	5.06
Yoga	95	12.32
Tai chi	3	0.39
Chiropractic	31	4.02
Acupuncture	22	2.85
Cupping	4	0.52
Healing	5	0.65
Prayer	51	6.61
Energy therapy	5	0.65
Reiki	6	0.78
Rosen method	0	0.00
Zone therapy	19	2.46
Salt therapy	4	0.52
Chakra therapy	3	0.39
Ayurveda	7	0.91

Table 2

Responses to Survey Questions on Believed Benefit and Safety of Medicines, and Trust in Healthcare Professionals

Item	Fully disagree % (n)	Partly disagree % (n)	Partly agree % (n)	Fully agree % (n)
Benefit and safety of medicines				
Medicines do more harm than good	45.07(343)	30.88(235)	13.01(99)	11.04(84)
It is safe to eat medicines	1.71(13)	15.53(118)	63.82(485)	18.95(144)
Medicines are an effective part of treating diseases	1.6(12)	2.5(19)	29.6(225)	66.3(503)
Medicines have improved peoples' health	1.86(14)	1.86(14)	22.77(171)	73.50(552)
Trust in healthcare professionals				
I let doctors make the decisions concerning my health	4.74(36)	21.21(161)	58.76(446)	15.28(116)
I feel heard when I visit the doctor	1.85(14)	8.97(68)	50.40(382)	38.79(294)
I am satisfied with the medical treatment I receive from doctors	1.72(13)	5.15(39)	48.68(369)	44.46(337)
I trust doctors' ability to make correct diagnoses	1.59(12)	8.59(65)	56.41(427)	33.42(253)
When doctors make medical decisions, they have the patients' best interest in mind	1.45(11)	6.33(48)	41.56(315)	50.66(384)
Doctors are too authoritative towards their patients	20.72(156)	51.00(384)	25.90(195)	2.39(18)

Main Analyses

We conducted structural regression (SR) analyses, which is a technique within structural equation modeling (SEM) where both latent and observed variables can be included in the same model. The analyses were conducted with the *laavan* package (version 0.6-3; Rosseel, 2012) in R (version 3.5.2; R Core Team, 2018). Robust WLS (WLSMV) estimation was applied, as the included variables were either ordinal or categorical, and the responses had a non-normal distribution. Pairwise deletion was used to handle missing data.

Measurement models. The predictors in the SR models consisted of two latent variables that measured general trust in healthcare professionals (Healthcare trust; 6 indicators) and perceived benefit and safety of general medicines (Medicines; 4 indicators), as well as an observed variable that measured use of CAM. The outcome variable was vaccination behaviour. See Figure 1 for an overview of the indicators and the factors they are specified to load on. Firstly, a two-factor model consisting of Healthcare trust and Medicines

was assessed, which showed good fit ($\chi^2(34) = 181.894$, CFI = .981, TLI = .974, RMSEA = .076, SRMR = .047). However, one indicator specified to load on the factor Medicines had a factor loading below .30 (“Medicines do more harm than good”) and was subsequently removed from the model. The final measurement model was then evaluated, and the fit indexes showed good fit ($\chi^2(26) = 163.549$, CFI = .983, TLI = .976, RMSEA = .083, SRMR = .048). The factor loadings associated with the indicators were all larger than .40 (see Table 3).

Figure 1

The Indicators and the Factors They are Specified to Load on

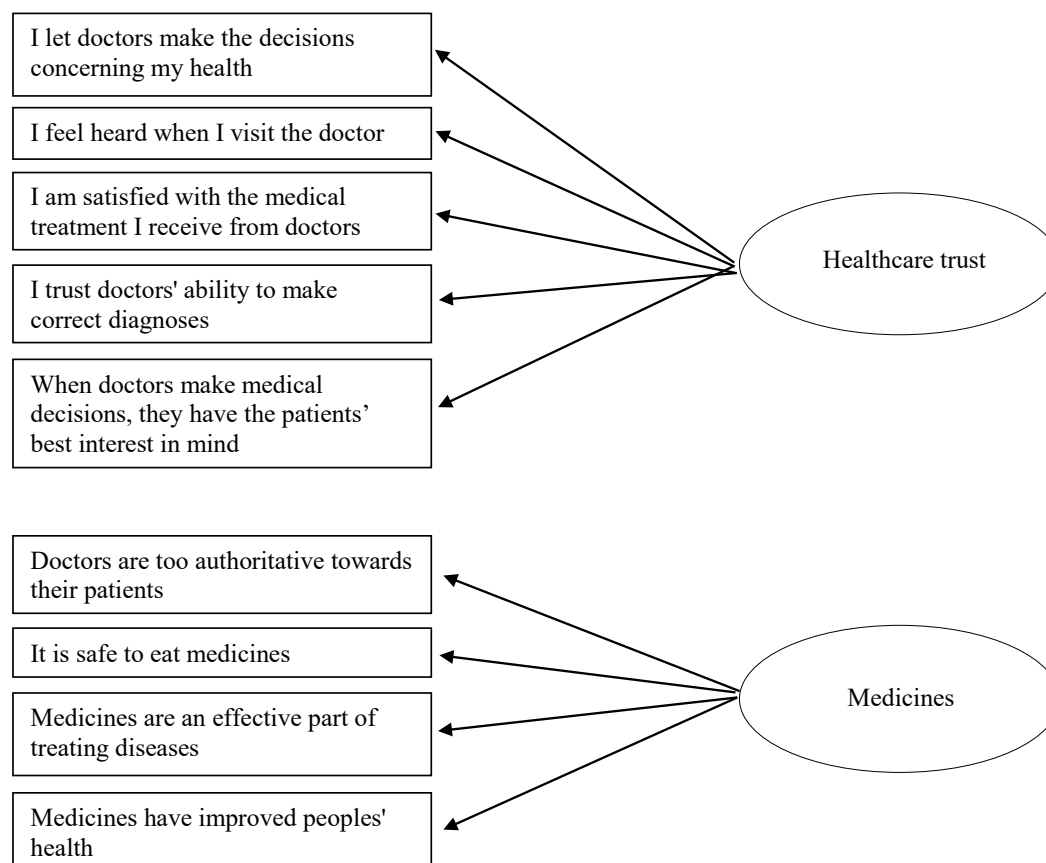


Table 3

The Factor Loadings Associated with the Indicators in the Final Measurement Model

Item	Medicines	Healthcare trust
I let doctors make the decisions concerning my health		0.411
It is safe to eat medicines	0.752	
I feel heard when I visit the doctor		0.806
Medicines are an effective part of treating diseases	0.912	
I am satisfied with the medical treatment I receive from doctors		0.872
I trust doctors' ability to make correct diagnoses		0.842
When doctors make medical decisions, they have the patients' best interest in mind		0.820
Medicines have improved peoples' health	0.824	
Doctors are too authoritative towards their patients		0.481

Structural regression. Two SR models were fitted to the data. The first model consisted of the latent variables Healthcare trust and Medicines, as well as the observed variable regarding use of CAM preparations. The outcome variable, own vaccination behaviour, was regressed on Healthcare trust, Medicines and use of CAM. The second model included the same outcome variable. It was regressed on the latent variables Healthcare trust and Medicines, as well as the observed variable concerning use of CAM treatments.

The first SR model showed a good fit ($\chi^2(42) = 275.969$, CFI = .966, TLI = .963, RMSEA = .085, SRMR = .046). Healthcare trust was a significant predictor of vaccination behaviour ($\beta = -.240$, 95% CI [-.419, -.061], $SE = .091$, $z = -2.633$, $p = 0.008$), which indicates that lower levels of trust in healthcare professionals were associated with a higher degree of hesitation,

postponing and rejecting childhood vaccines. The model also showed that use of CAM preparations had a significant direct effect on vaccination behaviour ($\beta = .163$, $SE = .029$, $z = 5.623$, $p < .001$, 95% CI [.106, .220]). This indicates that parents who used more forms of CAM preparations more often reported having hesitated, postponed or rejected childhood vaccines. However, there was no significant direct association between Medicines and vaccination behaviour ($\beta = -.044$, $SE = .095$, $z = -.464$, $p = .643$, 95% CI [-.231, .143]). The second SR model also showed a good fit ($\chi^2(42) = 224.538$, CFI = .975, TLI = .974, RMSEA = .075, SRMR = .046). Healthcare trust was again a significant predictor of vaccination behaviour ($\beta = -.237$, $SE = .089$, $z = -2.663$, $p = .008$, 95% CI [-.411, -.063]), where lower levels of trust in healthcare professionals were associated with a higher degree of hesitation, postponing and rejecting childhood vaccines. Use of CAM treatments also significantly predicted vaccine-related behaviour ($\beta = .178$, $SE = .031$, $z = 5.675$, $p < .000$, 95% CI [.117, .240]), which indicates that parents who used more CAM treatments were more likely to report that they had hesitated, postponed or rejected vaccines. Medicines was again not a significant predictor ($\beta = -.052$, $SE = .093$, $z = -.561$, $p = .575$, 95% CI [-.236, .131]).

Discussion

Despite vaccination being a greatly successful and effective public health measure, the rise of vaccine hesitancy in the presence of affordable and easily accessible vaccines is a growing problem. The reasons behind vaccine hesitancy are diverse and yet to be fully investigated. The majority of earlier studies have merely looked at correlational relationships, which makes inferences challenging. The aim of the present study was therefore to investigate whether trust in healthcare professionals, perceived benefit and safety of medicines, and use of CAM predicted vaccine-related behaviour in parents to small children.

Although the majority of respondents adhered to the national vaccination programme for children, a considerable part of the sample reported that they had hesitated, postponed or

rejected one or more childhood vaccines. The most commonly reported reasons for hesitancy were fear of side effects and the belief that vaccine-preventable diseases are not serious. Most parents had used some form of CAM in the last year, where the most common form were probiotics. The number of parents who reported that they had used CAM was considerably larger in this study than in an earlier study of Finnish parents (Hämeen-Anttila et al., 2011), but this is probably due to the substantially longer time period we asked the parents to consider.

In accordance with earlier research (Gaudino & Robison, 2012; Glanz et al., 2013), the result from this study showed that parents with lower trust in healthcare professionals were significantly more likely to hesitate, postpone and reject childhood vaccines. The use of complementary and alternative medicine was directly related to vaccination behaviour as well, where parents who used more forms of CAM more often hesitated, postponed and rejected childhood vaccines. This was true regarding both treatments and preparations. This result is in accordance with earlier studies where participants that used CAM were more likely to report vaccine hesitancy and rejection of vaccines (Wardle et al., 2016; Zuzak et al., 2008). It is worth mentioning, however, that earlier studies mainly have focused on CAM treatments, with the assumption that the practitioners impose their view of vaccines onto the customers (Wardle et al., 2016). On the other hand, our study shows that merely using CAM, without necessarily the presence of a practitioner, is directly related to more hesitation, postponing and rejection of vaccines.

Preferring CAM to conventional medicine and using spirituality as a source of knowledge both predict negative attitudes to vaccination (Browne et al., 2015). This might imply that the association between CAM use and vaccine hesitancy stems from a belief that vaccines are unnatural while CAM is holistic, pure, and spiritual. Since CAM consists of practices outside of evidence-based medicine, another explanation for the relationship

between CAM use and vaccine hesitancy could be the above-mentioned distrust in healthcare professionals. Although this study indicates that CAM, distrust in healthcare professionals and vaccine-related behaviour are related, the reasons behind these relationships are yet to be investigated and should be a subject of further research.

The parents' beliefs about the benefit and safety of medicines were not, however, directly related to their vaccination behaviour regarding childhood vaccines. This might, in part, stem from the small number of questions in our survey that targeted these beliefs.

Limitations

The results in this study are based on participants' self-reported attitudes and behaviours, which might be biased by social norms or difficulty remembering. However, by using a questionnaire administered online it was possible to gather a large sample, which increased the generalizability of the results from this study.

Another limitation is the choice of complementary and alternative medicines to be included in the questionnaire. There are no precise guidelines for which CAMs to be included in a list of that sort, which made the choice ambiguous at times. We excluded vitamins, for example, but included probiotics. Additionally, one might question whether probiotics, for example, should be included in the same group as colloidal silver, considering the vast difference between these preparations. Furthermore, it would be of interest to gather information on the participants' reasons for using CAM, as well as the number of times using it. There is presumably a great discrepancy between using it to fend off flu or using it to get rid of cancer.

Conclusions

The vast majority of Finnish parents adhere to the national vaccination programme, but a considerable number has hesitated, postponed or completely rejected one or more childhood vaccines. Both their level of trust in healthcare professionals and their use of complementary and alternative medicine was related to their vaccine-related behaviour. Their

perceived benefit and safety of medicines, however, did not predict vaccination behaviour.

The mechanisms behind the above-mentioned relationships are still largely unknown and requires further research. However, the present study points to the need for a trustful relationship between medical personnel and parents, in order to maintain high vaccine coverage and reduce hesitant attitudes towards vaccines.

Svensk sammanfattning

Tillit till hälsovårdspersonal, upplevd nytta av och säkerhet hos mediciner, samt användning av CAM som prediktorer av vaccinrelaterat beteende hos finska föräldrar

Inledning

Vaccinering är en av de mest framgångsrika folkhälsoåtgärderna genom tiderna. Trots den stora framgången hos immunisering finns det en växande grupp människor som uppfattar vacciner som osäkra och onödiga, något som på senare tid har kallats ”tveksamhet mot vacciner”. Enligt Världshälsoorganisationen handlar denna tveksamhet om att skjuta upp vaccinering eller att helt vägra ta en eller flera vaccin (www.who.int). Det finns dock variation mellan studier gällande definitionen och operationaliseringen av tveksamhet mot vacciner. Trots varierande definitioner av denna tveksamhet är det ett fenomen som studeras i allt högre grad, och som nu har associerats med ett flertal olika faktorer (Larson m.fl., 2014; Bean & Catania, 2018; Attwell m.fl., 2018; Brewer m.fl., 2017).

I vissa Europeiska områden har vaccinupptagningen minskat, och nu ökar en del sjukdomar som kan förebyggas med vacciner (Larson, de Figueiredo, Karafillakis, & Rawal, 2018). Vår studie genomfördes i Finland, där en klar majoritet av befolkningen följer det nationella vaccinationsprogrammet. Enligt Nationella institutet för hälsa och välfärd i Finland (www.thl.fi) ligger exempelvis vaccintäckningen för mässlingsvaccinet på 96,1 % hos finska barn födda år 2016. Det finns dock distrikt med lägre täckning, vilket innebär att det finns en risk att icke-vaccinerade individer samlas på en plats och skapar ett sjukdomsutbrott (Fine, Eames, & Heymann, 2011; Jansen m.fl., 2003). I Finland är vaccin gratis och lättillgängligt, vilket gör motiven bakom en tveksamhet mot vacciner till ett viktigt forskningsområde.

En faktor som har associerats med tveksamhet mot vacciner är misstro mot medicinska auktoriteter (Glanz m.fl., 2013). I en studie rapporterade föräldrar att de inte trodde att läkare gav dem balanserad information om både fördelar och nackdelar med

vaccinering (Glanz m.fl., 2013). En annan studie fann att föräldrar som ansökte om att befrias från vaccinationskravet hade högre sannolikhet att rapportera misstro mot läkare (Gaudino & Robinson, 2012).

En annan faktor som har kopplats ihop med både tveksamhet mot vacciner och misstro mot medicinska auktoriteter är tron på alternativ- och komplementärmedicin (CAM; Wardle m.fl., 2016; Busse, Walji, & Wilson, 2011). Trots att det inte finns empirisk evidens för nytta hos CAM är det mycket populärt och används av en stor del av befolkningen. Flera studier har visat att många utövare av CAM har en negativ inställning till vaccinering (Lee & Kemper, 2002; Russel m.fl., 2004; Bean & Catania, 2013), och en studie visade att användare av CAM signifikant oftare avstod helt från vacciner än de som inte använde CAM i någon form (Zuzak m.fl., 2008). I en studie av finska föräldrar fann de att en negativ inställning mot mediciner i allmänhet var vanligare bland de som använde CAM än bland de som inte använde det (Hämeen-Anttila, 2011).

I Finland finns det få studier som har undersökt beteende relaterat till vaccin. Syftet med denna studie var därför att undersöka huruvida tillit till hälsovårdspersonal, upplevd nytta av och säkerhet hos mediciner, samt användning av alternativ- och komplementärmedicin (CAM) predicerar vaccinrelaterat beteende hos finska småbarnsföräldrar. Vi har endast fokuserat på vacciner som ingår i det nationella vaccinationsprogrammet i Finland.

Metod

Samplet i denna studie var en del av forskningsprojektet Finnbrain (www.finnbrain.fi) som rekryterat småbarnsföräldrar i Åbo och på Åland. Sammanlagt deltog 771 föräldrar, varav 500 personer (64,9 %) var kvinnor och 271 personer (35,1 %) var män. Data samlades in genom en internetbaserad enkät. Enkäten mätte deras tillit till hälsovårdspersonal, deras tilltro till säkerheten och nytta hos mediciner generellt, samt deras användning av alternativa behandlingar och preparat under det föregående året. Föräldrarna rapporterade också huruvida

de hade tvekat, skjutit upp eller helt avfärdat något av de vaccin som ingår i det nationella vaccinationsprogrammet i Finland.

Mått

Upplevd nytta av och säkerhet hos mediciner mättes med fyra påståenden, där deltagarna fick ange i hur hög grad påståendet överensstämde med deras åsikter. Skalan gick från 1 (*håller inte alls med*) till 4 (*håller helt med*). Den del av enkäten som mätte tillit till hälsovårdspersonal bestod av sex påståenden, och använde samma skala som nämns ovan.

Användning av CAM mättes med hjälp av en lista av alternativ- och komplementärmedicin, där deltagarna fick kryssa i vad de använt under de senaste tolv månaderna. Dessa delades sedan in i preparat respektive behandlingar, enligt hur de används.

Slutligen fick föräldrarna ange huruvida de tvekat inför att ge sina barn vaccin, skjutit upp vaccineringen av sina barn eller helt avstått från att vaccinera barnen.

Resultat

Efter att medicinska skäl tagits i beaktande var det 26,2 % av föräldrarna som rapporterade att de hade tvekat inför, skjutit upp eller helt avstått vaccin för sina barn. Många ansåg att vacciner inte var säkra på grund av bieffekter, att vacciner inte var effektiva och att sjukdomar som kan förebyggas med hjälp av vacciner inte är farliga. Gällande CAM var det 77,4 % som angav att de använt något preparat eller någon behandling under det senaste året.

Statistiska analyser

Strukturella regressionsanalyser genomfördes med hjälp av paketet lavaan (version 0.6-3; Rosseel, 2012) i programmet R (version 3.5.2; R Core Team, 2018). Prediktorerna i de strukturella regressionsmodellerna bestod av två latent variabler som mätte tillit till hälsovårdspersonal (6 indikatorer) och upplevd nytta av och säkerhet hos mediciner (4 indikatorer), samt en observerad variabel som mätte användning av CAM. Resultatvariabeln var vaccinationsbeteende. Den slutliga modellen visade en god anpassning ($\chi^2(26) = 163.549$,

CFI = .983, TLI = .976, RMSEA = .083, SRMR = .048). Samtliga faktorladdningar var högre än 0,40.

Två strukturella regressionsmodeller anpassades till studiens data. Den första modellen innehöll ovannämnda variabler, men lämnade bort CAM-behandlingar och inkluderade endast preparat. Denna modell visade en god anpassning ($\chi^2(42) = 275.969$, CFI = .966, TLI = .963, RMSEA = .085, SRMR = .046). Tillit till läkare samt användning av CAM-preparat var signifikanta prediktorer av vaccinrelaterat beteende, men upplevd nytta av och säkerhet hos mediciner var inte det. Den andra regressionsmodellen inkluderade återigen ovannämnda variabler, men lämnade denna gång bort CAM-preparat och inkluderade endast behandlingar. Även hos denna modell var anpassningen god ($\chi^2(42) = 224.538$, CFI = .975, TLI = .974, RMSEA = .075, SRMR = .046). Tillit till hälsovårdspersonal samt användning av CAM-behandlingar var signifikanta prediktorer av vaccinrelaterat beteende, men attityden till mediciner var inte det.

Diskussion

Trots att vaccinering är ett effektivt och framgångsrikt sätt att främja folkhälsan finns det ett växande problem med personer som är tveksamt inställda till vacciner. Orsakerna bakom denna tveksamhet är mångfacetterade och till stor del outforskade. Syftet med denna studie var därför att undersöka huruvida tillit till hälsovårdspersonal, upplevd nytta av och säkerhet hos mediciner, samt användning av alternativ- och komplementärmedicin (CAM) predicerar vaccinrelaterat beteende hos finska småbarnsföräldrar.

Trots att majoriteten av deltagarna agerade i enlighet med det nationella vaccinationsprogrammet var det en betydande del av föräldrarna som rapporterade att de hade tvekat inför, skjutit upp eller helt avstått vacciner för sina barn. Majoriteten av deltagarna hade använt någon form av alternativ- och komplementärmedicin under det senaste åren, varav probiotika var den mest rapporterade varianten.

I enlighet med tidigare forskning (Gaudino & Robison, 2012; Glanz m.fl., 2013) visade resultatet i denna studie att föräldrar med lägre tillit till hälsovårdspersonal hade en signifikant högre sannolikhet att rapportera att de hade tvekat inför, skjutit upp eller avstått vacciner. Även användandet av CAM var signifikant relaterat till vaccinbeteende, där föräldrar som använde fler former av CAM signifikant oftare hade tvekat inför, skjutit upp eller avstått vacciner. Tidigare studier av relationen mellan CAM och vaccinrelaterat beteende har främst fokuserat på utövare av CAM, med antagandet att utövarna påverkar sina klienter negativt. Denna studie fokuserade dock på de som använder CAM, oberoende av utövarna, och hur detta är kopplat till vaccinationsbeteende.

Begränsningar

Eftersom resultaten i denna studie baserar sig på självskattningsformulär kan dessa ha påverkats av deltagarnas vilja att svara enligt sociala normer eller deras bristande minne. Denna form av datainsamling tillät oss dock att samla in data från en stor mängd föräldrar, vilket ökar generaliserbarheten av resultaten i studien.

En annan begränsning gäller listan över alternativ- och komplementärmedicin, eftersom det inte finns några riktlinjer gällande vad som borde inkluderas i listan. Det kan därför hända att resultatet blir annorlunda om andra former av CAM inkluderas. Vi sökte heller inte svar på varför deltagarna hade använt CAM, vilket kan ha betydelse för hur man ska tolka resultaten. Det är givetvis en stor skillnad mellan att använda ett preparat för att förebygga förkylning och att använda detsamma för att bota cancer.

Sammanfattning

Majoriteten av finska föräldrar håller sig till det nationella vaccinationsprogrammet, men en betydande del av dem har tvekat inför, skjutit upp eller helt avstått vacciner för sina barn. Både deras nivå av tillit till läkare och deras användning av alternativ- och komplementärmedicin var relaterade till deras vaccinationsbeteende. Mekanismerna bakom dessa relationer är till stor del okända. Resultaten från denna studie tyder dock på att en

tillitsfull relation mellan föräldrar och hälsovårdspersonal är viktigt för att bibehålla en hög vaccinationstäckning och för att minska tveksamhet mot vacciner.

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Appendix A

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
- Vegetarian 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*

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. Regulations trigger a sense of resistance in me.	1	2	3	4	5
2. I find contradicting others stimulating.	1	2	3	4	5
3. When something is prohibited, I usually think, “That’s exactly what I am going to do”.	1	2	3	4	5
4. The thought of being dependent on others aggravates me.	1	2	3	4	5
5. I consider advice from others to be an intrusion.	1	2	3	4	5
6. I become frustrated when I am unable to make free and independent decisions.	1	2	3	4	5
7. It irritates me when someone points out things which are obvious to me.	1	2	3	4	5
8. I become angry when my freedom of choice is restricted.	1	2	3	4	5
9. Advice and recommendations usually induce me to do just the opposite.	1	2	3	4	5
10. I am content only when I am acting of my own free will.	1	2	3	4	5
11. I resist the attempts of others to influence me.	1	2	3	4	5
12. It makes me angry when another person is held up as a role model for me to follow.	1	2	3	4	5

13. When someone forces me to do something, I feel like doing the opposite.	1	2	3	4	5
14. It disappoints me to see others submitting to standards and rules.	1	2	3	4	5

QUESTIONNAIRE 4 – *Personality, TIPI*

	Disagree strongly					Agree strongly	
	1	2	3	4	5	6	7
1. Extraverted, enthusiastic	1	2	3	4	5	6	7
2. Critical, quarrelsome	1	2	3	4	5	6	7
3. Dependable, self-disciplined	1	2	3	4	5	6	7
4. Anxious, easily upset	1	2	3	4	5	6	7
5. Open to new experiences, complex	1	2	3	4	5	6	7
6. Reserved, quiet	1	2	3	4	5	6	7
7. Sympathetic, warm	1	2	3	4	5	6	7
8. Disorganized, careless	1	2	3	4	5	6	7
9. Calm, emotionally stable	1	2	3	4	5	6	7
10. Conventional, uncreative	1	2	3	4	5	6	7

QUESTIONNAIRE 5 - *Perceived Vulnerability to Disease*

	Strongly disagree					Strongly agree	
1. It really bothers me when people sneeze without covering their mouths.	1	2	3	4	5	6	7
2. If an illness is 'going around', I will get it.	1	2	3	4	5	6	7
3. I am comfortable sharing a water bottle with a friend.	1	2	3	4	5	6	7
4. I don't like to write with a pencil someone else has obviously chewed on.	1	2	3	4	5	6	7
5. My past experiences make me believe I am not likely to get sick even when my friends are sick.	1	2	3	4	5	6	7
6. I have a history of susceptibility to infectious diseases.	1	2	3	4	5	6	7
7. I prefer to wash my hands pretty soon after shaking someone's hand.	1	2	3	4	5	6	7
8. In general, I am very susceptible to colds, flu, and other infectious diseases.	1	2	3	4	5	6	7
9. I dislike wearing used clothes because you don't know what the past person who wore it was like.	1	2	3	4	5	6	7
10. I am more likely than the people around me to catch an infectious disease.	1	2	3	4	5	6	7

11. My hands do not feel dirty after touching money.	1	2	3	4	5	6	7
12. I am unlikely to catch a cold, flu, or other illness, even if it is going around.	1	2	3	4	5	6	7
13. It does not make me anxious to be around sick people.	1	2	3	4	5	6	7
14. My immune system protects me from most illnesses that other people get.	1	2	3	4	5	6	7

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 through 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 behaviour*

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

1. No
2. Yes

2) Have you ever postponed a vaccination for your child(ren) with any of the **childhood vaccines**?

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 your 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 last **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** last 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:

10) 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

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

