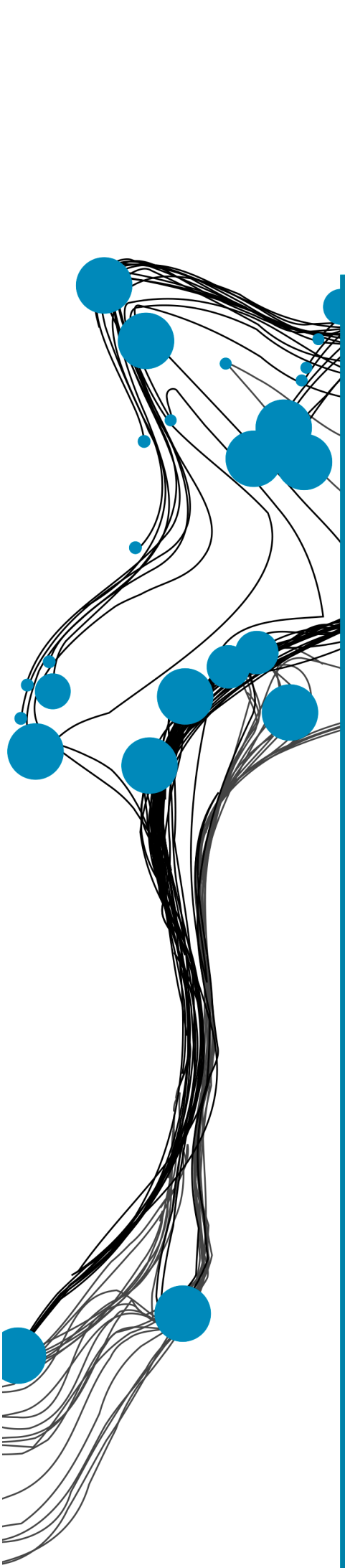

Master Thesis

Factors influencing adolescents' uptake of and intention to receive the MenACWY-vaccination in the Netherlands: A Cross-Sectional Study.

T. van den Berg
S2025639

Faculty of Science and Technology
Health Sciences

Examination Committee:
First Supervisor: Prof. Dr. A. Need
Second Supervisor: Dr. M.M. Boere - Boonekamp

February 2019 – July 2019

UNIVERSITY OF TWENTE.

Preface

This thesis is the final component before obtaining the title 'Master of Health Sciences' with a focus on innovation in public health at the University of Twente. After a challenging and fun period of hard work during the masters and this thesis, I proudly present this thesis entitled: '*Factors influencing adolescents' uptake of and intention to receive the MenACWY-vaccination in the Netherlands: A Cross-Sectional Study*'. I have learned a lot and I would like to thank the people who supported me during this final period of my studies.

First of all, I would like to thank Prof. Dr. Ariana Need and Dr. Magda Boere-Boonekamp, my first and second supervisor, for their support and valuable, critical feedback on my thesis. In addition, I would like to thank Ben and Jan, high school teachers, for their effort in allowing me to enroll this study among their students to generate a great number of responses.

Furthermore, I would like to thank all respondents for taking the time and efforts to fill in the questionnaire during a stressful time in their studies with the (final) exams in sight.

Finally, I would like to thank my family and friends for their unconditional support, advice, and trust in me.

I hope that you will enjoy reading my thesis.

Tom van den Berg
Enschede, July 2019.

Abstract

Background: The incidence of meningococcal disease serogroup W in the Netherlands has been stable up to 2014; serogroup W has caused 4 cases of meningococcal disease on average per year. The incidence of serogroup W has been increasing; 9 cases in 2015, 50 cases and 7 deaths in 2016, 80 cases and 11 deaths in 2017, and 103 cases and 22 deaths in 2018. Serogroup W is becoming a threat to public health in the Netherlands; the in 2002 implemented MenC-vaccine (serogroup C) for children at the age of 14-months old was replaced with the MenACWY-vaccine (serogroup A, C, W, and Y) in the National Immunization Program in 2018. A catch-up campaign is initiated in 2018 to offer all adolescents born between 2001-2005 the MenACWY-vaccine in 2018-2019. The uptake of the MenACWY-vaccine among adolescents in the catch-up campaign in 2018 is 87%. Taking the severe consequences of meningococcal disease in mind, it is desired to reach an uptake as high as possible to induce herd immunity. Evidence is missing on factors that influence the uptake of and intention to receive the MenACWY-vaccine by adolescents. The research questions in this study: 1) '*What factors influence adolescents' uptake of and intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019?*'. 2) '*Where do adolescents look for information, how would adolescents like to receive information, and what information about vaccine-preventable diseases would adolescents like to receive?'*.

Methods: This study used a literature study and a questionnaire based on the Health Belief Model conducted among adolescents to determine the factors that influence the uptake of and intention to receive the MenACWY-vaccine and the preferences of adolescents in the provision of information. The response rate to the questionnaire was 48.7%, 242 responses were found eligible for analysis. Of the 127 adolescents that received an invitation to receive the MenACWY-vaccine; the uptake was 78.7%. Of the 139 adolescents that did not receive the MenACWY-vaccine, the mean intention to receive the MenACWY-vaccine was 2.63 (five-point Likert-scale: 0-4). SPSS was used to analyze the data. The association between the dependent and independent variables was tested using the ANOVA and Spearman-Correlation.

Results: Adolescents that follow the 'VWO' educational level have the highest uptake of the MenACWY-vaccine followed by adolescents that follow 'VMBO-T' and 'HAVO'. The intention to receive the MenACWY-vaccine is highest among unreligious adolescents and among adolescents whose parents belong to the 're-reformed' religion. Adolescents whom themselves and their parents follow the 'Islam' religion have the lowest intention. Adolescents without migration background are associated with a higher uptake and intention. Adolescents who have more knowledge about meningococcal disease have a higher uptake and intention. Adolescents who perceive themselves susceptible to meningococcal disease have a higher uptake and intention. Adolescents who perceive meningococcal disease as severe have a higher uptake and intention. Adolescents who perceive more benefits from the MenACWY-vaccine and cues-to-action have a higher uptake and intention. Adolescents would look for information about vaccines on internet pages, through their parents/guardians, a doctor/nurse, or their friends. Adolescents would like to receive information through a folder/letter, their parents/guardians, a website, a doctor/nurse, and in class. Adolescents would like to receive the following information about vaccines: susceptibility to the Vaccine Preventable Disease (VPD), the risk on side-effect from the vaccine, the effectiveness of the vaccine in preventing VPDs, the content of a vaccine, the number of cases of the VPD, hospital admissions and deaths, and the experience of other adolescents with the vaccine.

Conclusion: Adolescents' uptake of and intention to receive the MenACWY-vaccine is associated with educational level, religion, migration background, knowledge about meningococcal disease, perceived susceptibility, perceived severity, perceived benefits, and cues-to-action. Future implementation of adolescents' MenACWY-vaccination should focus on three aspects: 1) the provision of information to increase the knowledge of adolescents and thus, increase the perceived susceptibility, severity, and benefits, 2) Research has to be done on the factors that influence the intention of parents to recommend the MenACWY-vaccine to their child, and 3) research has to be done on the influence of the adolescents' educational level on the uptake of and intention to receive the MenACWY-vaccine.

Samenvatting

Introductie: Meningokokken W is een gevaar voor de volksgezondheid in Nederland. Het aantal gevallen van meningokokken W in Nederland was stabiel tot 2014; gemiddeld waren er jaarlijks vier gevallen. Na 2014 steeg het aantal (sterfte)gevallen van meningokokken W: 9 gevallen in 2015; 50 gevallen en 7 sterftegevallen in 2016; 80 gevallen en 11 sterftegevallen in 2017; en 103 gevallen en 22 sterftegevallen in 2018. Om te voorkomen dat het aantal (sterfte)gevallen van meningokokken W verder toeneemt werd het sinds 2002 geïmplementeerde meningokokken C-vaccin voor kinderen van 14-maand oud vervangen door het meningokokken ACWY (MenACWY)-vaccin binnen het rijksvaccinatieprogramma in 2018. Ook werd in 2018 een overheidscampagne gestart waarin jongeren, welke zijn geboren tussen 2001-2005, het MenACWY-vaccin krijgen aangeboden in 2018-2019. De vaccinatiegraad van het MenACWY-vaccin in deze campagne onder jongeren in 2018 is landelijk 87%. Gezien de ziektelast en het stijgende aantal (sterfte)gevallen van meningokokken W zou het optimaal zijn als de vaccinatiegraad van dit vaccin zo hoog mogelijk is zodat groepsimmuniteit wordt bereikt. Kennis over de factoren welke de vaccinatiegraad en intentie van jongeren beïnvloedt om zich te laten vaccineren met het MenACWY-vaccin ontbreekt. De onderzoeksvragen die in dit onderzoek centraal staan: 1) *'Welke factoren beïnvloeden de vaccinatiegraad en de intentie van jongeren om zich te laten vaccineren met het MenACWY-vaccin in de overheidscampagne in Nederland in 2018/2019?*' en 2) *'Waar zoeken jongeren informatie, hoe willen jongeren informatie, en welke informatie over door vaccins te voorkomen ziektes willen jongeren ontvangen?*'.

Methode: De onderzoeksvragen zijn beantwoord door middel van een literatuuronderzoek en een vragenlijst gebaseerd op het *Health Belief Model*. De vragenlijst is uitgezet onder tieners om factoren te vinden die de vaccinatiegraad en de intentie van jongeren om zich te laten vaccineren met het MenACWY-vaccin beïnvloedt en om de voorkeuren van jongeren omtrent de provisie van informatie te vinden. De response op de vragenlijst was 48.7%; de antwoorden van 242 jongeren zijn meegenomen in de analyse. Onder de 127 jongeren die een uitnodiging hebben ontvangen om het MenACWY-vaccin te ontvangen is de vaccinatiegraad van het MenACWY-vaccin 78.7%. Onder de 134 jongeren die het MenACWY-vaccin niet hebben ontvangen is de intentie om het vaccin alsnog te gaan halen 2.63 (vijf-punts Likert-schaal: 0-4). SPSS is gebruikt om de data te analyseren en significante verbanden te ontdekken; deze verbanden zijn ontdekt door de ANOVA en Spearman-Correlatie uit te voeren op de vaccinatiegraad en intentie en de verschillende variabelen van het *Health Belief Model.*

Resultaten: Jongeren welke op vwo zitten hebben de hoogste vaccinatiegraad, gevolgd door jongeren die op vmbo-t en havo zitten. De intentie om het MenACWY-vaccin te halen is het hoogst onder niet-religieuze jongeren en onder jongeren waarvan de ouders tot het gereformeerde geloof behoren. De intentie om het MenACWY-vaccin te halen is van alle religies het laagst onder de Islamitische jongeren en onder jongeren met Islamitische ouders. Jongeren zonder een migratieachtergrond hebben een hogere vaccinatiegraad en intentie. Jongeren die meer kennis hebben over meningokokkenziekte hebben een hogere vaccinatiegraad en intentie. Jongeren die vinden dat zij vatbaar zijn voor meningokokkenziekte hebben een hogere vaccinatiegraad en intentie. Jongeren die vinden dat meningokokkenziekte een ernstige ziekte is hebben een hogere vaccinatiegraad en intentie. Jongeren die meer voordelen zien aan het halen van het MenACWY-vaccin en jongeren die veel stimulansen ervaren om het MenACWY-vaccin te halen hebben een hogere vaccinatiegraad en intentie.

Jongeren zoeken naar informatie over vaccinaties op het internet, via hun ouders/verzorgers, een verpleegkundige/arts en via vrienden. Jongeren willen graag informatie ontvangen via een folder, via ouders/verzorgers, een website, een verpleegkundige/arts en op school. Jongeren willen graag informatie over de vatbaarheid van de door vaccins te voorkomen ziekte, het risico op bijwerkingen van het vaccin, hoe effectief het vaccin beschermd tegen de door vaccin te voorkomen ziekte, de inhoud van een vaccin, het aantal gevallen, ziekenhuisopnames en sterftegevallen veroorzaakt door de vaccin te voorkomen ziekte en de ervaring van andere jongeren met het vaccin.

Conclusie: De vaccinatiegraad en intentie om het MenACWY-vaccin te ontvangen wordt beïnvloed door opleidingsniveau, religie, migratieachtergrond, kennis over meningokokkenziekte, vatbaarheid en ernst van meningokokkenziekte, voordelen van het MenACWY-vaccin en de stimulansen om zich te

laten vaccineren. De implementatie van het MenACWY-vaccin zou zich in de toekomst kunnen richten op drie aspecten: 1) Informatievoorziening richting jongeren richt zich op het bevorderen van kennis over meningokokkenziekte en focust daarbij op de vatbaarheid, ernst van meningokokkenziekte en het voordeel van het MenACWY-vaccin, 2) verder onderzoek is benodigd naar factoren die de intentie van ouders beïnvloedt om het MenACWY-vaccin aan hun kind aan te raden, en tot slot 3), verder onderzoek is benodigd naar de invloed van het opleidingsniveau van jongeren op de vaccinatiegraad en intentie om het MenACWY-vaccin te halen.

Index

1. Introduction

The study described in this paper focusses on the factors that influence adolescents' uptake of and intention to receive the MenACWY-vaccine in the Netherlands in 2018 and 2019. The introduction starts with information about infectious diseases and the national immunization program (NIP) in the Netherlands, followed by the epidemiology of meningococcal disease, and primary prevention of meningococcal disease. Finally, the knowledge gap and research question for this study are presented.

1.1: Infectious diseases

WHO (2019) defines infectious diseases as diseases that are caused by pathogenic microorganisms (bacteria, viruses, parasites or fungi) which can be spread, directly or indirectly, from one person to another. Infectious diseases transmit through the chain of infection. The definition of the *chain of infection* by the Center of Disease Control (CDC) (2012): '*a transmission that occurs when the infectious pathogen leaves its reservoir or host through a portal of exit, is conveyed by some mode of transmission, and enters through a portal of entry to infect a susceptible host*'. Control measures, to contain the infectious disease, are focused on the most susceptible segment of the chain of infection to intervention. Interventions are directed at controlling and eliminating the infectious pathogen at the source of transmission, protecting portals of entry, and decreasing the susceptibility of the host. The susceptibility of the host can be decreased by vaccinating individuals. Vaccinations promote the host to develop specific antibodies that prevent infectious pathogens from becoming an infectious disease. Herd immunity can also prevent infectious pathogens from encountering a susceptible host. Herd immunity implies that if a high enough proportion of individuals are resistant to an infectious pathogen, the individuals who are susceptible to the infectious pathogen will be protected as the hosts are less susceptible (CDC, 2012).

Infectious diseases are a threat to public health as infectious diseases can harm the health of individuals who, in turn, can unintentionally harm the health of others. Infectious diseases can limit and distort society as individuals are incapable of protecting themselves from infectious diseases. Government involvement is needed when vaccination has public health or societal importance (Gezondheidsraad, 2018). The WHO has initiated the Global Vaccine Action Plan (GVAP) to improve health by extending the full benefits of immunization to all people, regardless of where they are born, who they are, or where they live (WHO, 2013). In the Netherlands, the government is involved in public vaccination through surveillance on infectious diseases and the National Immunization Program (NIP).

1.2: Vaccination in the Netherlands

The NIP in the Netherlands started in 1957. The NIP aims to protect the Dutch population from serious infectious diseases, prevent complications and deaths from diseases that are preventable through vaccination. This protection includes the protection of the individuals receiving the vaccine, to prevent the spread of infectious pathogens, and to prevent epidemics using herd immunization. In order to reach this herd immunity, a large proportion of the population must be vaccinated. Young children are the most vulnerable to infectious diseases. The Dutch government, Ministry of Health, Welfare and Sport, offers every child vaccinations against 12 infectious diseases. These vaccinations are free, and participation is not compulsory (RIVM, N.D.-a; RIVM, 2018-b; RIVM, 2018-d). The content of the NIP is determined by the Minister of Health, Welfare, and Sport; the minister decides after being advised by the health council. The health council advises the minister based on scientific knowledge and (surveillance) data about (preventing) infectious diseases in the Netherlands. The health council uses criteria to determine whether it is necessary to embed a vaccine in the NIP. When the intended vaccine meets these seven criteria it is embedded in the Dutch NIP (Gezondheidsraad, 2018).

The *Rijksinstituut voor Volksgezondheid en Milieu* (RIVM) (National Institute for Health and the Environment) is responsible for arranging the distribution of vaccines, arranging invitations to participate in the NIP, register the vaccinations and the administered vaccinations, and checking the vaccinations for accuracy. The Youth Health Care Services (YHCS) of the municipal health service (GGD)

is responsible for the implementation of the NIP (RIVM, 2018-c). In Figure 1, the current vaccination schedule of the Dutch NIP is shown.

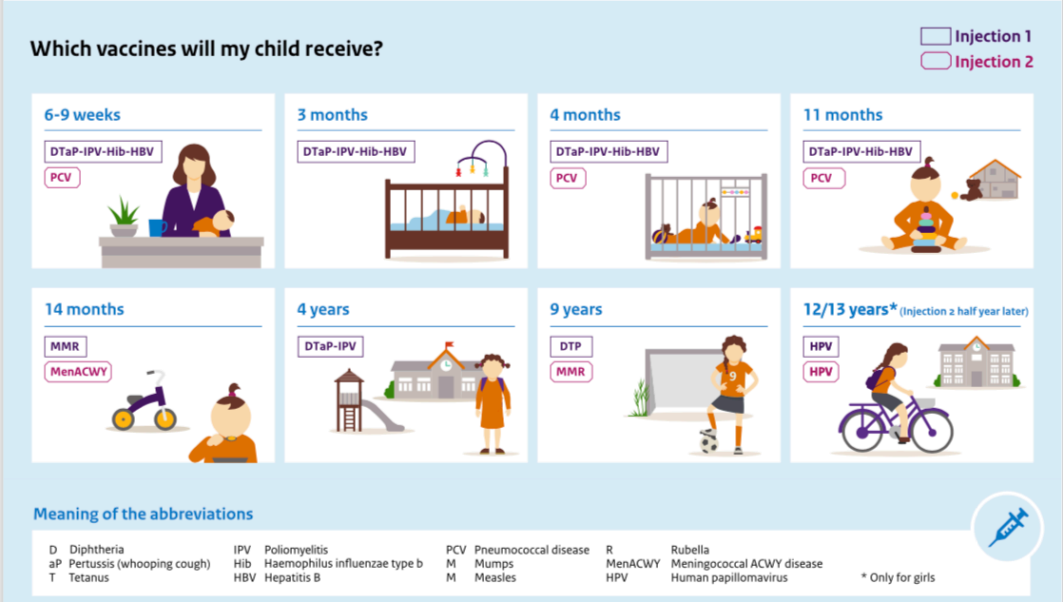

Figure 1: Vaccination schedule. Retrieved from RIVM, N.D.-b.

The RIVM defines immunization coverage (i.e. vaccination coverage) as the proportion of newborns, toddlers, and schoolchildren who have received the vaccinations within the NIP at a certain age (RIVM, 2018-d). The vaccination coverage of the NIP is registered in the *Praeventis*-system since 2005 which is linked to the *basisregistratie persoonsgegevens* (registration of personal data) (Gezondheidsraad, 2018; RIVM, 2018-d). The Dutch NIP has a vaccination coverage >90% of vaccines that are embedded in the NIP for children. An exception is the vaccination coverage for the Human Papillomavirus (HPV) offered to adolescent girls has a vaccination coverage of 45.5% in 2018 (RIVM, 2018-d). The vaccination coverage of the NIP-vaccinations in 2018 is shown in Figure 2. Figure 1 and Figure 2 show a different vaccine (MenC and MenACWY) for meningococcal disease. This vaccine was changed in 2018; the change of vaccine is explained in detail in paragraph 1.3.3. The vaccination coverage of the Dutch NIP of the past 12 years is shown in Appendix I.

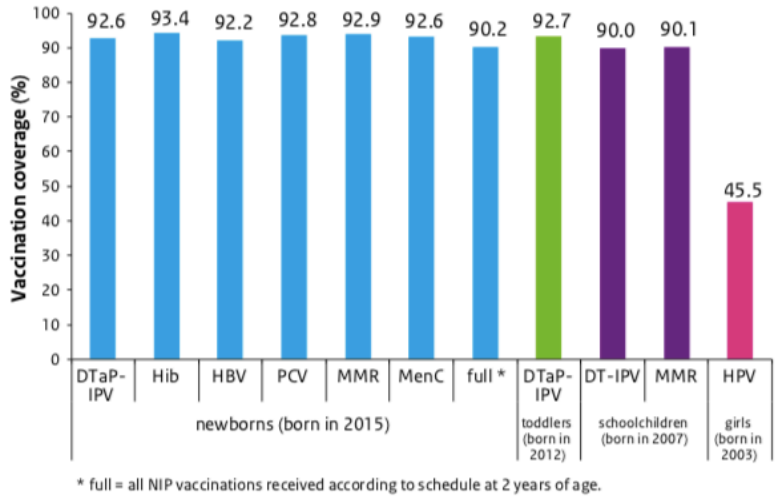

Figure 2: Vaccination coverage per vaccine for newborns, toddlers, children and adolescents girls in 2018. Retrieved from RIVM, 2018-b.

The RIVM annually writes a report about the NIP in the Netherlands and surveillance and developments that are linked to the NIP. In the report published in the fall of 2018, it is reported that the incidence of meningococcal disease is increasing rapidly in the last years and that the number of deaths caused by meningococcal disease is increasing (RIVM, 2018-b).

1.3: Meningococcal Disease

This paragraph describes meningococcal disease, the epidemiology of meningococcal disease, and how primary prevention of meningococcal disease is formalized in the Netherlands.

1.3.1: Meningoccal Disease

The gram-negative bacterium *Neisseria Meningitidis* or meningococcus causes meningococcal disease. The pathogen resides in the oropharynx of healthy individuals without causing disease. The bacterium causes severe disease if it invades in the bloodstream or the meninges. Meningitis and meningococcal sepsis could result in septic shock (RIVM, 2017). The main determinant of virulence is the meningococcal polysaccharide capsule, which is used to classify the species into 12 serogroups (Bijlsma et al., 2014; RIVM, 2017).

Humans are the reservoir for the meningococcus. Asymptomatic carriage occurs in 10-20%, and is highest among adolescents and young adults and is related to lifestyle. The mode of transmission of the pathogen is from human-to-human through respiratory droplets or saliva and spitting. Factors associated with increased susceptibility for (asymptomatic) meningococcal colonization in the oropharynx are smoking, sharing water pipes and drinking glasses. Once the pathogen has entered the host, most persons become an asymptomatic carrier for a short period but are still able to transmit the pathogen to other humans (RIVM, 2017). Intrinsic factors are factors that are present in the host; extrinsic risk factors are factors that are present outside the host. Intrinsic risk factors for infection with meningococcal disease are an open connection between the nasopharynx and oropharynx and the meninges, malignancies, diabetes mellitus, chronic obstructive lung diseases, immune disorders, kidney-insufficiency, cirrhosis of the liver, and intravenous drug use. Crowding is an extrinsic risk factor. Crowding refers to a high density of people together, for example, adolescents in a classroom. Meningococcal disease is seen more often in infants, adolescents, and young adults because of crowding (RIVM, 2017; RIVM, 2019-a). The average incubation time of the pathogen is 3-4 days. The symptoms of meningococcal disease can vary widely and are usually not specific at disease onset. The first symptoms often resemble those of sudden flu, which then rapidly progresses to severe disease. Meningococcal disease caused by serogroup W often starts with atypical symptoms, such as pneumonia, septic arthritis and (severe) gastroenteritis. Meningococcal disease is often not recognized at first due to the fast progression of the disease and the atypical symptoms (RIVM, 2017; Gezondheidsraad, 2018; WHO, 2018).

The diagnosis of Meningococcal Meningitis consists of clinical examination and a lumbar punction showing purulent spinal fluid. The diagnosis is supported or confirmed by growing the bacteria from specimens of spinal fluid or blood by agglutination tests and by a polymerase chain reaction. Identifying serogroups and susceptibility to antibiotics are essential to define the control measures and treatment of the patient. Meningococcal disease is potentially fatal and should be treated as a medical emergency. Possible sequelae of meningococcal disease are not preventable by treatment. Intravenous antibiotic treatment must start as soon as possible (RIVM, 2017; WHO, 2018). Despite quick and adequate treatment, in 5-10% of all patients with meningococcal disease, the infection will result in death. In meningococcal sepsis, the case fatality rate is 20-50% within 24 hours despite adequate and quick treatment. Complications that can occur when surviving meningococcal disease: acute respiratory distress syndrome, multi-organ failure, clamping, coma, pneumonia, diabetes insipidus, myocardial insufficiency, arthritis, pericarditis, and conus medullaris syndrome. Other possible complications with influence on daily functions that can occur: difficulty in learning and focusing, epilepsy, deafness, strabismus, and hydrocephalus. Another complication could be (partial) amputation of limbs due to sepsis and necrosis (RIVM, 2019-a).

The burden of disease is measured in disability-adjusted life years (DALY). The annual burden of disease in European Union/European Economic Area-countries for invasive meningococcal disease (meningitis and meningococcal sepsis) is estimated to be 780 DALY in 2013, 590 DALY in 2014, 560 DALY in 2015, 870 DALY in 2016 and 1100 DALY in 2017. The proportion of DALY caused by the vaccine-preventable serogroup C in 2017: 3%, the proportion caused by serogroup B: 54% and the proportion caused by serogroup W: 34%. The burden of disease is high in comparison to other infectious diseases (RIVM, 2018-b).

1.3.2: Epidemiology in the Netherlands

In the Netherlands, infectious diseases are obliged to be reported, such as meningococcal disease, to the municipal health centre / *Gemeentelijke Gezondheidsdienst* (GGD) according to the public health law (wet publieke gezondheid) (RIVM, 2019-a; RIVM, 2019-e). The Netherlands Laboratory for Bacterial Meningitis (NRLBM) performs the laboratory surveillance of meningococcal disease. The NRLBM is a collaboration of the Amsterdam Medical Centre with the RIVM. The NRLBM receives blood, or cerebrospinal fluid isolates positive for *Neisseria Meningitidis* of all microbiological laboratories in the Netherlands. Data of the notification system and laboratory surveillance are linked to a surveillance system (RIVM, 2017).

The Incidence rate is defined as the number of new cases per year per 100,000 persons. Case fatality rate (CFR) is defined as the percentage of all cases that have died. The incidence rate of meningococcal disease (all serogroups) in the Netherlands has declined from 4.5 in 2001 to 0.49 in 2014. Since 2015, the incidence rate of meningococcal disease is increasing, up to an incidence of 1.3 in August 2018 (RIVM, 2018-b). A visual representation of the incidence of meningococcal disease per year sorted by serogroup (B, C, W & Y) in the Netherlands is given in Figure 3.

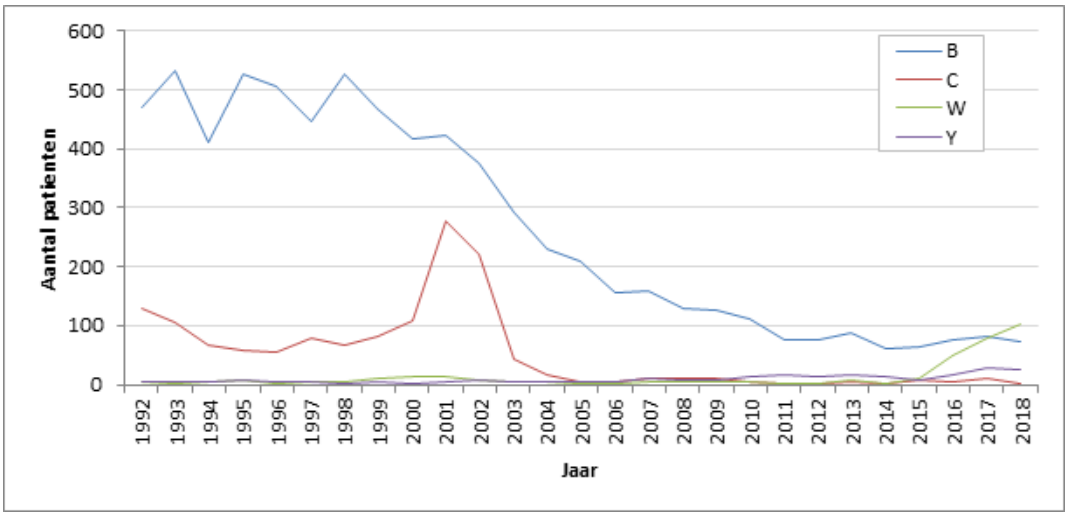

Figure 3: Number of patients with meningococcal disease in the Netherlands by serogroup, 1992 - 2018. Reprinted from RIVM, 2019-d, retrieved from https://www.rivm.nl/meningokokken.

The incidence rate of serogroup B has declined since the late nineties, and the incidence has stabilized to an incidence rate of 0.5. In 2017, there were 81 cases of serogroup B, and there were five deaths (CFR: 6.3%). Meningococcal disease serogroup C was epidemic in 2002: 1.7 (333 new cases). As to be read in section 1.3.3, after implementing a vaccine for this serogroup in 2002, the incidence rate has stabilized to <0.1. In 2017, there were 5 cases of serogroup C, and none of these cases has died. The incidence of serogroup W has been stable up to 2014 with an incidence rate of 0.03 (on average, 4 cases per year). The incidence of serogroup W has been increasing since 2015; 9 cases in 2015 (0.05/100,000), 50 cases in 2016 (0.3/100,000), 80 cases in 2017 (0.47/100,000), and 103 cases in 2018 (0.6/100,000). Serogroup W caused 6 deaths in 2016, 11 deaths in 2017, and 22 deaths in 2018 (CFR 2018: 21.3%). The incidence rate of serogroup Y has risen from <0.1 in 2016 to 0.16 in 2017 (13 cases

of serogroup Y per year). Serogroup Y caused one death in 2018 (CFR: 10%). Serogroup A was not seen in the Netherlands since 2004, and serogroup X was found four times in total in the period from 2008 – 2018 and has caused no deaths (ECDC, 2019; Gezondheidsraad, 2018; RIVM, 2017; RIVM, 2018-b; RIVM, 2018-d; RIVM, 2019-b). In Appendix II, the incidence and the number of cases for each serogroup of meningococcal disease from 1999-2018 in the Netherlands are shown.

The increased incidence of serogroup W is a threat to public health in the Netherlands. The number of infections with serogroup W has increased from 4 new cases in 2014 to 103 in 2018, and the number of deaths has increased from 0 deaths in 2014 to 22 deaths in 2018 (ECDC, 2019; RIVM, 2018-d; RIVM, 2019-b). The highest incidence of serogroup W in the European Union (EU) in 2017 is to be found in the Netherlands (0.47/100,000), followed by the United Kingdom (UK) (0.33/100,000). In Appendix III and IV, the incidence and the number of cases for each serogroup of meningococcal disease from 1999-2018 in the EU and UK are shown. Knol et al. (2017) states that there is a pattern between the incidence of serogroup W in the Netherlands and the UK. The hypervirulent strain of serogroup W (MenW:cc11) is the same in the UK and the Netherlands. In the UK, the incidence of serogroup W increased substantially: from 34 new cases (0.05/100,000) in 2011 to 236 new cases (0.36 per 100,000) in 2016. As to be seen in the numbers mentioned above, the incidence of serogroup W seems to be rising much faster in the Netherlands than in the UK (ECDC, 2019; Knol et al., 2017; RIVM, 2019-b).

1.3.3: Primary Prevention

Meningococcal disease is preventable through active immunization. Active immunization is done through polysaccharide vaccines and conjugated vaccines. Polysaccharide vaccines are used in response to outbreaks as these vaccines offer 3-year protection, do not induce herd immunity, and are not effective in children younger than two years old. Conjugated vaccines are used in routine immunization schedules, and preventive campaigns as these vaccines offer longer-lasting immunity (>5 years), prevent carriage, induce herd immunity, and are effective in children from 2 months old (RIVM, 2019-a; WHO, 2018).

In the Netherlands, vaccination for meningococcal disease started in 2002 during the epidemic of serogroup C as 287 new cases were found in 2001. The vaccine for serogroup C (MenC) was provided to the Dutch public as a mass vaccination campaign in 2002 to children between 12 months and 18 years old. The vaccination coverage of this mass vaccination campaign in the Netherlands for MenC was 94%. The MenC vaccine was implemented in the NIP for children at the age of 14 months. The vaccination coverage for the MenC vaccine within the NIP since 2002 was always >90%. The vaccination coverage of the MenC vaccine at the age of 14 months has decreased from 95.3% in 2015 to 92.6% in 2018. Since the mass vaccination campaign and implementation of the vaccine in the NIP, the incidence rate of serogroup C has declined and stabilized to <0.1 per 100,000. This decline is due to the effects of herd immunization induced by the vaccination campaign and implementation of the vaccine in the NIP (Knol et al., 2017; RIVM, 2017; RIVM, 2018-b; RIVM, 2018-d).

The vaccination for serogroup W started in 2018 as this serogroup started becoming a threat to public health in the Netherlands. The Dutch Minister of Health decided to start implementing the quadrivalent conjugate meningococcal vaccination (MenACWY-TT: Nimenrix). A catch-up vaccination campaign was initiated, and the vaccine is embedded in the NIP. This catch-up campaign aims to offer all children born between 2001-2005 an invitation to receive the MenACWY-vaccine. The Youth Healthcare Service is responsible for the implementation of the catch-up campaign. Children born between 1 May – 31 December 2004 have received an invitation in 2018 to get the MenACWY catch-up vaccine at a municipal health centre (GGD). Adolescents who do not respond to the invitation will receive a reminder within several weeks. The vaccination coverage for this catch-up vaccination was 87% in 2018. Children born in 2001, 2002 and children who are born from 1 January – 31 April 2004 will receive an invitation in March-April 2019. Children born in 2003 and 2005 will receive an invitation in May-June 2019. The MenACWY-vaccine is replacing the MenC -vaccine in the NIP for children at the age of 14 months (Knol et al., 2018; RIVM, 2019-b; RIVM, N.D.-c).

The strategy that is followed for serogroup W in the Netherlands is similar to the strategy that is followed in the UK. The response of the UK to the serogroup W outbreak in 2016 was to replace the MenC-vaccine at the age of 13-14 years in the UK's NIP with the MenACWY vaccine and to initiate a mass vaccination campaign to all 13-18 year old's with the MenACWY in 2017. The vaccination coverage of the MenACWY vaccine within UK's NIP for 13-14-year-olds was 86.2%, and for 14-15 year old's the vaccination coverage was 84.6% (Public Health England, 2019). The vaccination in the catch-up campaign was done in three rounds based on the date of birth. The vaccination coverage in the catch-up vaccination of MenACWY for the first group (1/9/1996 - 31/8/1997) was 39.5%, the second group (1/9/1997 – 31/8/1998) 36.8%, and the third group (1/9/97 – 31/8/98) 39.8% (Public Health England, 2018). The incidence of meningococcal disease serogroup W in the UK has decreased from 236 new cases in 2016 to 217 new cases in 2017 since the vaccine in the NIP has been changed, and the mass vaccination campaign was initiated (CDC, 2019).

The Dutch health council has advised the Minister of Health to include the vaccination for serogroup C and serogroup W at the age of 14-months and at the age of 14-years old in the Dutch NIP. The health council advises this as the effectiveness of the MenC vaccine has decreased in adolescents, and herd immunity is not induced effectively (Gezondheidsraad, 2018). To reduce the incidence and mortality of meningococcal disease, it is important that a large proportion of the eligible population is vaccinated within the NIP and in the current mass-vaccination campaign. The vaccination coverage of the mass-vaccination campaign in 2018 in the Netherlands was 87%. Research has to be done to explain the current vaccination coverage in adolescents and to determine the factors that influence the decision on getting the vaccine or not.

1.4: Knowledge gap

In this paragraph, the current knowledge is described on factors that influence the uptake of and the intention to receive the MenACWY-vaccine of adolescents in the catch-up campaign in the Netherlands in 2018/2019 to define the scientific relevance of this study.

Before the start of the catch-up campaign for adolescents to receive the MenACWY-vaccine, the RIVM has initiated a questionnaire to ask adolescents and their parents about their opinion on the MenACWY-vaccine for adolescents and how this should be organized. The questionnaire was filled in by 115 adolescents and 106 parents. The questionnaire used a 7-point Likert-scale. Of the 115 adolescents, 74% reported a positive attitude (Likert-scale 5-7) towards vaccination in general, whereas 77% of 115 adolescents reported a positive attitude (Likert-scale 5-7) towards the MenACWY vaccine. For parents, this reported positive attitude was 88% towards vaccination and 73% towards the MenACWY vaccine. Of the 115 adolescents, 61% reported getting the MenACWY vaccine, whereas 70% of the parents would have their child get the MenACWY vaccine. Of all adolescents, 83% and 91% of the parents have reported meningococcal disease as a severe disease. Of all 115 adolescents, 50% and 24% of the parents have reported that they would have a high chance of contracting meningococcal disease. Adolescents have reported that they would discuss their decision regarding getting the MenACWY with their parents (91%), friends (20%), general practitioner (19%), classmates (18%), teacher (9%), child vaccine providers (8%), and nobody (3%). The adolescents reported that they wanted to receive information about the risk of contracting meningococcal disease (79%), and about the effectiveness of the vaccine (63%). Adolescents would like to receive information from the general practitioner (57%), and school (50%). Most parents wanted to receive information about the risk of side-effects (89%). Parents would like to receive information from the Public Health Institute (70%). Information was wanted to be received by letter or brochure (57%). Adolescents wanted the general practitioner to provide the vaccine (86%) and their parents to be present during the vaccination (86%). Half of the adolescents and parents wanted to receive the vaccine in group-vaccinations, the other half wants to receive the vaccine individually. Half of the participants would like to have a face-to-face meeting with a professional before vaccination (RIVM, 2018-b).

The RIVM has initiated the PIOM-study (suitable information about meningococcal disease / *Passende Information Over Meningokokkenziekte*). This study has the aim of getting insight in the

advisory role of healthcare professionals (general practitioner, youth medical doctors, youth nurses) in providing information to the public about meningococcal disease and vaccination and what their needs are in providing this information. The PIOM-study will use interviews with stakeholders (youth and healthcare professionals) and questionnaires. The interviews were held from April – May 2018, and the questionnaire is distributed in the summer of 2018 (RIVM, 2018-e). The outcomes of this study were unknown at the time this study was conducted. The Health Council gives advice in their report of December 2018 about aspects of the implementation of the NIP. For the MenACWY vaccine, the council advises continuing vaccinating adolescents with the MenACWY-vaccine as herd immunity of the MenC vaccine that they have received has decreased and needs to be boosted using the MenACWY-vaccine. The health council has also advised to study how to reach the adolescents for participating in the NIP for the MenACWY-vaccine (Gezondheidsraad, 2018).

Based on the current knowledge, the preferences of the adolescents that are eligible to receive the MenACWY vaccine are known towards the organization of vaccination. It is unclear how these preferences influence the uptake of the MenACWY-vaccine. The PIOM-study focuses on the risk perception of adolescents and their parents towards meningococcal disease and the need for the provision of information. The health council advises to study on how to reach adolescents with information about meningococcal disease. This study will focus on the factors that influence the uptake of the MenACWY-vaccine by adolescents in the catch-up campaign and how the adolescents prefer to be informed about the MenACWY vaccination. In the next paragraph, the research question will be outlined.

1.5: Research question

The incidence of meningococcal disease subgroup W is increasing in the Netherlands. The incidence of serogroup W has been increasing since 2015; 9 cases in 2015, 50 cases in 2016, 80 cases in 2017, and 103 cases in 2018. Serogroup W has caused 6 deaths in 2016, 11 deaths in 2017, and 22 deaths in 2018. The disease burden of meningococcal disease (meningitis and meningococcal sepsis) is high, especially for subgroup W with high mortality. In the Netherlands, the MenACWY vaccine was embedded in the NIP in May 2018, and a catch-up vaccination campaign is initiated in 2018 and 2019 for children aged 13/14-18 (year of birth: 2001 – 2005). In 2018, the vaccination uptake for the MenACWY vaccine in the catch-up campaign was 87%. The aim of this study is to determine the factors that influence adolescents' uptake of and intention to receive the MenACWY-vaccine, and to give recommendations on how to improve the vaccination coverage for the MenACWY catch-up campaign and future MenACWY-vaccination of adolescents.

The population studied is the eligible population of the MenACWY-vaccine: adolescents aged between 14-19 years old. However, some adolescents in the studied population did not yet receive an invitation to receive the MenACWY-vaccine in the catch-up campaign at the start of this study. As the vaccination of adolescents with the MenACWY-vaccine is carried out during the time that this study was conducted, the intention to get the MenACWY-vaccine is determined of respondents that did not yet receive an invitation and were not yet vaccinated with the MenACWY-vaccine.

Research-question 1:
What factors influence adolescents' uptake of and intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019?
Sub-questions:
- What is the current knowledge on factors that influence the uptake of and intention to receive vaccines?
- What factors influence the uptake of and intention to receive the MenACWY-vaccine by adolescents?

Research-question 2:
Where do adolescents look for information, how would adolescents like to receive information, and what information about vaccine preventable diseases would adolescents like to receive?

2. Theoretical Framework

This chapter starts with a description of the Health Belief Model, followed by a mini-review to determine the current knowledge on the factors from the health belief model that influence vaccine uptake in the Netherlands and factors that influence vaccine uptake by adolescents.

2.1: Health Belief Model

The Health Belief Model (HBM) was constructed in the 1950s to explain the widespread failure of people to participate in programs to prevent and detect disease (Rosenstock, 1966; Janz & Becker, 1984; Champion & Skinner, 2008). The HBM is based on two understandings: the desire to avoid illness, and the belief that a specific health action will prevent illness (Rosenstock, 1974; Janz & Becker, 1984). The HBM takes six variables into account as *modifying factors*. These variables are *age*, *gender*, *ethnicity*, *personality*, *socioeconomics*, and *knowledge*. The HBM consists of six concepts that predict why people will act to prevent, to screen for, or to control illness conditions. These six concepts are *perceived susceptibility*, *perceived severity*, *perceived benefits*, *perceived barriers*, *cues-to-action,* and *self-efficacy*. *Perceived susceptibility* and *perceived severity* are known as the *perceived threat*. The *perceived threat* is known as *risk perception*. Dubé et al. (2013) defines *risk perception* as the perceived vulnerability or likelihood of harm if no action is taken and perceived severity or seriousness of the consequences if harm was to occur. *Perceived benefits* and *perceived barriers* are known as the *preferred path.* The *modifying factors* and *cues-to-action* influence the perceptions as mentioned above and thus, health-related behavior (Champion & Skinner, 2008; Carpenter, 2010). Table 1 shows the definitions of the modifying factors and concepts of the HBM, and Figure 4 shows the relationship among factors and concepts of the HBM.

Table 1: Definitions of the Health Belief Model.

Factor:	Definition:
Modifying factors	
Age	The period of time someone has been alive (Cambridge Dictionary, 2019).
Gender	The characteristics of women and men that are socially constructed (WHO, N.D.).
Ethnicity	A broad range of characteristics, including shared origins and culture, traditions, common sense of identity, language or religious traditions and the links with a particular geographical area (Stronks, Kulu-Glasgow & Agyemang, 2009).
Personality	An individual's unique variation on the general evolutionary design for human nature, expressed as a developing pattern of dispositional traits, characteristic adaptations, and integrative life stories complexly and differentially situated in culture (Cloninger, 2009; p.5).
Socioeconomics	A measure of an individual's combined economic and social status. Focuses on three measures: education, income and occupation (Baker, 2014).
Knowledge	The knowledge of the individual about the preventive measure and illness (Champion & Skinner, 2008; Carpenter, 2010).
Concepts	
Perceived susceptibility	Beliefs about the chances of experiencing a risk or getting a disease or condition (Champion & Skinner, 2008; p. 48).
Perceived severity	Beliefs about the seriousness of contracting an illness or leaving it untreated include evaluations of both medical and clinical consequences and possible social consequences (Champion & Skinner, 2008; p.47).
Perceived benefits	Beliefs about the efficacy of the advised action to reduce the risk or seriousness of impact (Champion & Skinner, 2008; p. 48).
Perceived barriers	Beliefs about the tangible and physiological costs of the advised action (Champion & Skinner, 2008; p. 48).
Cues to action	Strategies to activate readiness. How the individual is spurred to adopt the preventive behavior by some additional element (Champion & Skinner, 2008; p. 48; Carpenter, 2010).
Self-efficacy	The conviction that one can successfully execute the behavior required to produce the outcomes (Champion & Skinner, 2008: p. 49).

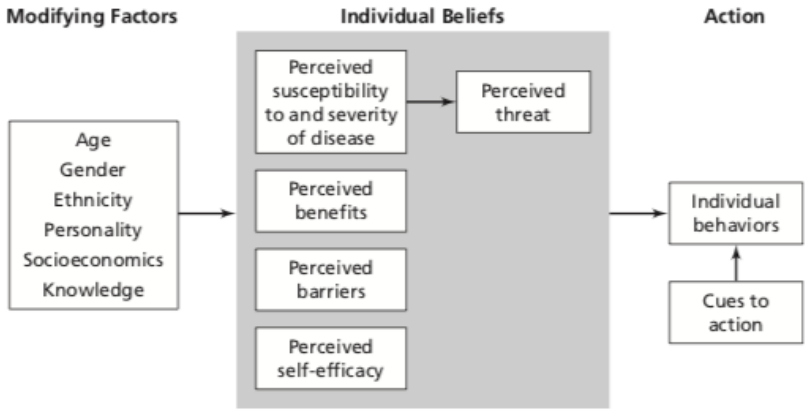

Figure 4: Health Belief Model Components and Linkages. Retrieved from Champion & Skinner, 2008.

The HBM is used to answer the research question as the model takes the modifying factors and individual beliefs into account. At this point, no evidence is available on the factors that influence the uptake of and intention to receive the MenACWY-vaccine by adolescents in the Netherlands. As aforementioned, the HBM is constructed to explain the widespread failure of people to participate in programs to prevent disease. Seen the knowledge gap on the factors that influence the intention and uptake of the MenACWY catch-up vaccination among adolescents in the Netherlands, the HBM is used to find the factors that influence the uptake of and intention to receive the MenACWY-vaccine by adolescents in 2018/2019. The HBM has also been used in other studies to understand vaccination behavior for vaccinations such as influenza, measles and human papillomavirus (HPV) (Blagden, Seddon, Hungerford & Stanistreet, 2017; Grandahl et al., 2016).

In the next paragraph, a mini-review will be conducted to determine the current knowledge about the factors that influence the uptake of and intention to receive vaccines and to determine the modifying factors and concepts that are most relevant in the use of the HBM in measuring vaccine acceptance. The aim of the mini literature review is to limit the numbers of questions in the questionnaire. The mini-review will focus on vaccines in general as limited evidence is available on the factors that influence the uptake of and intention to receive the MenACWY-vaccine.

2.2: Mini-review

A mini-review was conducted to answer the sub-question: ‘*‘What is the current knowledge on modifying factors and concepts of the Health Belief Model that influence the uptake of and intention to receive vaccines?*’. The current knowledge on the factors that influence the acceptance of vaccines is retrieved using the mini-review as initiated by Griffiths (Griffiths, 2002). A literature search was performed in Scopus, Web of Science, Cochrane library and PubMed using a combination of words equal or similar to ‘factors’, ‘Health Belief Model’, ‘adolescents’, ‘Netherlands’, ‘vaccine uptake’, and ‘intention’. Detailed information on the used search words can be found in Appendix V. The eligibility of the included articles is assessed in three rounds. The first selection was based on the title, followed by reviewing the abstracts of the selected articles according to the inclusion and exclusion criteria according to the PICOTS (population, intervention, comparators, outcomes, timing, and setting) categories. Finally, the articles are judged after full-text-reading (van der Zee – van den Berg, Boere – Boonekamp & IJzerman, 2017). The inclusion and exclusion criteria are shown in Table 2.

Table 2: Inclusion and exclusion criteria

Study Characteristics	Inclusion Criteria	Exclusion Criteria
Population	Children, adolescents, and young adults (0-25 years old) or their parents.	Young adults older than 25 years old or adults who are not parents.
Intervention	Vaccination	
Comparators	No vaccination	
Outcomes	Reported outcome provides information about facilitators, barriers, factors or	Reported outcome provides no information about factors, facilitators,

	determinants that influence vaccine uptake / intention.	barriers or determinants that influence vaccine acceptance/ uptake.
Timing	Published in or after 2014	Published before 2014
Setting	Study conducted in the following countries/regions: Europe, United States, United Kingdom, Canada and Australia.	Study conducted in another country/region.
Study design	Cross-sectional Longitudinal Logistic Regression Model Systematic-Review	
Report criteria	Article in English or Dutch. Factors that influence vaccine uptake.	Abstract or full-text not found.

The quality of the quantitative articles is reviewed based on the checklist from the National Heart, Lung, and Blood Association (N.D.). The quality of the systematic review is reviewed based on the PRISMA-checklist (Moher et al., 2009). The filled-in checklists for the included articles can be found in Appendix V. The flow diagram of the selection procedure can be found in Figure 5.

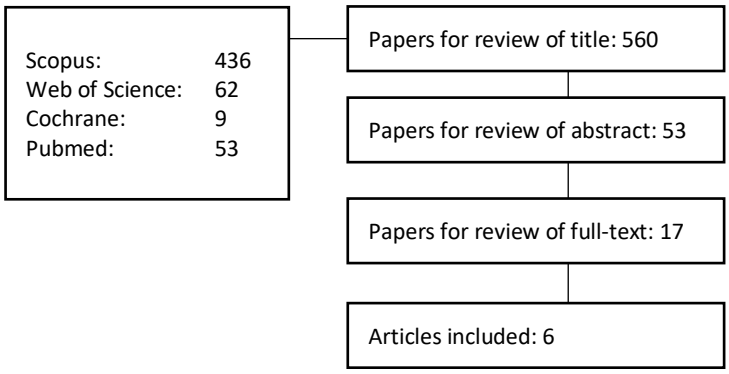

Figure 5: Flowchart mini-review

The included articles can be found in Table 3. This table shows the title, study design, outcome measures, and results. An extended overview of the included articles can be found in Appendix V.

Table 3: Study design, outcome measures and results of included articles.

Title	Study design	Outcome measures	Results
A longitudinal study on determinants of HPV vaccination uptake in parents/guardians from different ethnic backgrounds in Amsterdam, the Netherlands. (Alberts et al., 2017).	Longitudinal study. Questionnaire among parents of girls who have received an invitation for the HPV-vaccine from different migration backgrounds.	Impact of determinants and characteristics on both intention and uptake.	- The **uptake** of the HPV-vaccine is significantly associated with intention, subjective norms, habit strength and childhood vaccination status. - The **intention** to receive the HPV-vaccine is significantly associated with attitude, beliefs, risk perception when not vaccinating, relative effectiveness, subjective norms, descriptive norms, ambivalence towards the decision, information processing, evaluation of the HPV information, past experience with HPV-vaccination with older daughter, past experience with cervical cancer, education and religion.
Uptake of a new meningitis vaccination programme amongst first-year undergraduate students in the United Kingdom: A cross-sectional study.	Cross-sectional study. Questionnaire among first-year undergraduate university students in Liverpool.	MenACWY uptake and the influence of demographics and the Health Belief Model on the MenACWY uptake.	- The **uptake** of the MenACWY-vaccine is significantly associated with: age, gap-year status, knowledge about meningitis, and effectiveness of the vaccine in preventing meningitis.

(Blagden, Seddon, Hungerford & Stanistreet., 2017).			
The benefit of the doubt or doubts over benefits? A systematic literature review of perceived risks of vaccines in European populations. (Karafillakas & Larson, 2017).	Systematic review	Perceived beliefs of vaccines in the European population.	- Beliefs that are related to balancing risks of vaccination to non-vaccination are about vaccine safety and perceived low risk of contracting Vaccine Preventable Diseases. - Perceptions that are related to balancing risks of vaccination to non-vaccination are that VPDs are not dangerous, vaccines do not work, vaccines are not needed, adults and children are health enough not to need vaccination, not enough evidence, no recommendation to take the vaccine and a lack of information.
Motivational and contextual determinants of HPV-vaccination uptake: A longitudinal study among mothers of girls invited for the HPV-vaccination. (Pot et al., 2017).	Longitudinal study. Questionnaire.	Socio-ecological determinants and how this predicts the HPV-vaccination intention and uptake.	- The **uptake** of the HPV-vaccine is significantly associated with intention, attitude, subjective norm and age. - The **intention** to receive the HPV-vaccine is significantly associated with safety, government intervention, age of the daughter in relation to sexual activity, knowledge about side-effects, belief that the vaccine is introduced to create money for the pharmaceutical companies, the daughter is too young to receive the HPV-vaccine, too little is known about the effectiveness, subjective norms of partner and daughter, and the relative effectiveness in comparison to other preventive measures.
Determinants of students' willingness to accept a measles–mumps–rubella booster vaccination during a mumps outbreak: a cross-sectional study. (Donkers et al., 2015).	Cross-sectional study. Questionnaire.	Students' willingness and psychosocial and social demographic determinants influencing their willingness to accept an Measles Mumps and Rubella booster vaccination.	- The **willingness** to be vaccinated is significantly associated with the risk perceptions, outcome expectations, and social norms.
Vaccine uptake determinants in The Netherlands. (van Lier et al., 2014).	Hierarchical logistic regression model.	Determinants of vaccine uptake. Based on SES, religious objection and ethnic background.	- Postcode areas with a lower SES are associated with a lower 'full' vaccine uptake, postcode areas with a higher SES are associated with a higher 'full' vaccine uptake. - Municipalities with more SGP-voters are associated with lower 'full' vaccine uptake in that municipality. - The full uptake of vaccines is lower among children of whom one or both parents were born in another (non-) western country than the Netherlands or both parents were born in Turkey / Morocco.

The included articles use different outcome measures. In order to determine the size of the effect of the modifying factors and the concepts of the HBM on the uptake of and intention to receive a vaccine, criteria have been created in which the effect size is determined. These criteria can be found in Appendix VI. The findings of the mini-review are shown in sections 2.2.1 and 2.2.2; the research

question of this mini-review is answered in section 2.2.3. The described findings of the mini-review are based on the results from multivariate analysis, if the results from the multivariate analysis were not available, the results from the bivariate analysis were used.

2.2.1: Results mini-review: Modifying factors

The knowledge that was derived from the mini-review about the modifying factors of the HBM and the influence on the uptake of and intention to receive vaccines will be described in this section.

The study conducted by Blagden et al. (2017) found that age is a modifying factor on the uptake of the MenACWY-vaccine. This study uses the adjusted odds ratio (aOR), which represents that the odds ratio (OR) is adjusted for other variables in the multivariate analysis. In this study, the OR represents the odds that a student from another age-group is vaccinated compared to 18 year old students. The students that are most likely to be vaccinated are 18-years old students compared to older students (19: aOR: 0.087, 20: aOR: 0.019, and 21-25: aOR: 0.003[1]) (Blagden et al., 2017).

The studies conducted by Alberts et al. (2017) and van Lier et al. (2014) have found significant associations between ethnic background and uptake of and intention to receive vaccines. The study conducted by Alberts et al. (2017) has asked the intention of parents to have their daughter receive the HPV-vaccine prior to vaccination using a five-point Likert-scale (-2, 2). The odds ratio (OR) represents the increased odds of the daughter being vaccinated with the HPV-vaccine when one more point is given to the Likert-scale to measure intention. Dutch participants have a higher intention to vaccinate their daughter with the HPV-vaccine in comparison to participants from the SENA (Surinamese, Netherlands Antillean, and Aruban)-group, MENA (Middle-Eastern and North-African)-group, and other-group (OR NL: 5.67, OR SNA: 2.49, OR MENA: 2.94, OR other: 2.26) (Alberts et al., 2017). The study conducted by van Lier et al. (2014) has found that ethnic background influences vaccine uptake. The OR represents the odds of a child to have received all childhood vaccines in comparison to the Dutch-group. The percentage of children being fully vaccinated (all vaccines up to the age of 14 months) is lower among ethnicities other than Dutch (NL): children of whom one or both parents are born in another Western (OW) country or another non-Western (ONW) country other than the Netherlands (OW – OW: OR 0.5, ONW – ONW: OR 0.5, NL – OW: OR 0.8, NL-ONW: OR 0.8, OW – ONW: OR 0.6), both parents were born in Turkey (OR: 0.7) or Morocco (OR: 0.8) and if the country of birth was unknown for at least one parents (OR: 0.5) (van Lier, 2014).

The studies conducted by Alberts et al. (2017) and van Lier et al. (2014) have found significant associations between religion and the uptake of and intention to receive vaccines. The study conducted by Alberts et al. (2017) has found religion to be a modifying factor to the intention of Dutch parents to get their daughter vaccinated with the HPV-vaccine. The ß represents the increase/decline on the five-point Likert-scale (-2, 2) to measure the intention of parents to get their daughter vaccinated with the HPV-vaccine. The intention of the NL-group to get their daughter vaccination with the HPV-vaccine is lower among parents who are religious (ß: -0.20) in comparison to those who do not belong to a religion (Alberts et al., 2017). The study conducted by van Lier et al. (2014) has found that religion objection influences vaccine uptake. The percentage of children being fully vaccinated (all vaccines up to the age of 14 months) is lower in municipalities with more religious objection to vaccination (van Lier et al., 2014).

The studies conducted by Alberts et al. (2017) and van Lier et al. (2014) have found significant associations between socio-economics and the uptake of and intention to receive vaccines. The study conducted by Alberts et al. (2017) has shown that the intention of the NL-group to get their daughter vaccinated with the HPV-vaccine is significantly associated with the educational level of the parents. Parents with an intermediate level of education have a higher intention (ß: 0.14) in comparison to parents with a low educational level. Parents with a high level of education have a slightly smaller

[1] The odds ratio that is presented in the study conducted by Blagden et al. (2017) is very small. The odds ratio is this low as the MenACWY-vaccine is offered to adolescents up to 18 year-old in the UK. Students that are older than 18 years old did not get the invitation/opportunity to receive the MenACWY-vaccine.

intention (ß: 0.13) in comparison to parents with a low educational level (Alberts et al., 2017). The study conducted by van Lier et al. (2014) has found that the socio-economic status influences vaccine uptake. The percentage of children being fully vaccinated (all vaccines up to the age of 14 months) is higher in postcode areas with a higher SES (van Lier et al., 2014).

The systematic review conducted by Karakafillas & Larson (2017) has found that a lack of information/misunderstandings about vaccines is mentioned in 31 studies as a reason for vaccine hesitancy.

The study conducted by Alberts et al. (2017) has found, besides the modifying factors, childhood vaccination status as a factor significantly associated with the uptake of the HPV-vaccine. Children that have received all childhood vaccines are more likely to have received the HPV-vaccine vaccine (OR: 10.43) in comparison to children that did not receive all childhood vaccines (Alberts et al., 2017).

Table 4 gives an overview of the effect of the modifying factors of the HBM on the uptake of and intention to receive vaccines. The criteria in which the effect size (big/small/none) is determined are shown in Appendix VI.

Table 4: Overview of modifying factors and studies

Study / modifying factor	**Alberts et al. (2017).**	**Blagden et al. (2017).**	**Karakafillas & Larson. (2017).**	**Pot et al. (2017).**	**Donkers et al. (2015).**	**van Lier et al. (2014).**
Outcome Variable	Uptake & intention	Uptake	Vaccine hesitancy	Uptake & intention	Willingness	Uptake
Age	None	**Small effect	None	None	None	None
Gender	None	None	None	None	None	None
Ethnic background	**Intention: Big effect	None	None	None	None	*Big effect
Religion	**Intention: Big effect	None	None	None	None	*Big effect
Personality	None	None	None	None	None	None
Socio-economics	**Intention: Big effect	None	None	None	None	*Small effect
Knowledge	None	None	Big effect	None	None	None
Childhood Vaccine Status	** Uptake: Big effect	None	None	None	None	None

* Effect was found in bivariate analysis.
** Effect was found in multivariate analysis.

2.2.2: Results mini-review: Concepts of the HBM

The knowledge that was derived from the mini-review about the concepts of the HBM and the influence on the uptake of and intention to receive vaccines will be described in this section.

The studies conducted by Alberts et al. (2017), Blagden et al. (2017), Karakafillas & Larson (2017), and Donkers et al. (2015) have found (significant) associations between the perceived susceptibility and the uptake of and intention to receive vaccines. The study conducted by Alberts et al. (2017) has found that the perceived susceptibility is significantly associated with the intention of parents to get their daughter vaccinated with the HPV-vaccine. The intention of parents from the MENA-group to get their daughter vaccinated with the HPV-vaccine increases when the perceived severity increases (ß: 0.11) (Alberts et al., 2017). The study conducted by Blagden et al. (2017) has found that the perceived susceptibility is significantly associated with the uptake of the MenACWY-vaccine. Students who agreed that they were knowledgeable about their risk of contracting meningitis are more likely to be vaccinated than students who disagreed or neither agreed nor disagreed to be knowledgeable about their risk of contracting meningitis (aOR: 2.481) (Blagden et al., 2017). The systematic review conducted by Karakafillas & Larson (2017) has found that a low risk of contracting VPDs is mentioned

in 51 studies as a reason for vaccine hesitancy. The study conducted by Donkers et al. (2015) has found that the perceived susceptibility is significantly associated with the willingness to be vaccinated with the MMR-vaccine. The willingness is dichotomized as 'agree' and 'disagree'. Students that agree that mumps is not serious for them and that they do not want to be vaccinated have an OR of 0.25 in comparison to students that disagree that mumps is not serious for them and they do not want to be vaccinated (Donkers et al., 2015). This can be interpreted as students that perceive mumps as serious and do want to get vaccinated have a higher willingness to get the MMR-vaccine (Donkers et al., 2015).

The studies conducted by Karakafillas & Larson (2017) and Donkers et al. (2017) have found (significant) associations between the perceived severity and the uptake of and intention to receive vaccines. The systematic review conducted by Karakafillas & Larson (2017) has found that a low perceived severity of VPDs is mentioned in 36 studies as a reason for vaccine hesitancy. The study conducted by Donkers et al. (2015) has found that the perceived severity is significantly associated with the willingness to be vaccinated with the MMR-vaccine. Students that agree that mumps can have serious consequences for their health have an OR of 6.06 in comparison to students that disagree that mumps can have serious consequences for their health (Donkers et al., 2015).

The studies conducted by Alberts et al. (2017), Karakafillas & Larson (2017), Pot et al. (2017), and Donkers et al. (2015) have found (significant) associations between the perceived benefits and the uptake of and intention to receive vaccines. The study conducted by Albert et al. (2017) has found that the perceived benefits are associated with intention. The intention of parents from the NL-group to get their daughter vaccinated with the HPV-vaccine increases as the perceived benefits increase (ß: 0.11) (Alberts et al., 2017). The study conducted by Blagden et al. (2017) has found that perceived benefits are significantly associated with the uptake of the MenACWY-vaccine. Students that agreed that the MenACWY-vaccination is effective at preventing meningitis are more likely to be vaccinated than students who disagreed or neither agreed nor disagreed (aOR: 3.555) (Blagden et al., 2017).
The systematic review conducted by Karakafillas & Larson (2017) has found that low effectiveness of vaccines is mentioned in 32 studies as a reason for vaccine hesitancy. The study conducted by Pot et al. (2017) has found that the belief that there is too little known about whether the HPV-vaccination effectively protects against cervical cancer influences the intention of parents to get their daughter vaccinated with the HPV-vaccine. The respondents have a mean of 4.62 (on a Likert-scale from 1-7) and the standardized ß is -0.40 (Pot et al., 2017). This could be interpreted as parents that agree that there is too little known about whether the HPV-vaccination effectively protects against cervical cancer are less likely to get their daughter vaccination with the HPV-vaccine. The study conducted by Donkers et al. (2015) has found that the perceived benefits are significantly associated with the willingness to be vaccinated with the MMR-vaccine. Students that agree that they would accept the MMR-vaccination to prevent themselves from becoming ill have an OR of 2.80 in comparison to students that disagree that they would accept the MMR-vaccination to prevent themselves from becoming ill (Donkers et al., 2015).

The studies conducted by Karakafillas & Larson (2017) and Pot et al. (2017) have found (significant) associations between the perceived barriers and the uptake of and intention to receive vaccines. The systematic review conducted by Karakafillas & Larson (2017) has found that vaccine safety is mentioned as a reason in 107 studies as a reason for vaccine hesitancy. The study conducted by Pot et al. (2017) has found that the belief that there is too little known about the detrimental side-effects of the HPV-vaccination influences the intention of parents to get their daughter vaccinated with the HPV-vaccine. The respondents have a mean of 5.24 (on a Likert-scale from 1-7) and the standardized ß is -0.48 (Pot et al., 2017). This could be interpreted as parents that agree that there is too little known about detrimental side effects are less likely to get their daughter vaccinated with the HPV-vaccine.

The studies conducted by Karakafillas & Larson (2017), Pot et al. (2017), and Donkers et al. (2015) have found (significant) associations between the cues-to-action and the uptake of and intention to receive vaccines. The systematic review conducted by Karakafillas & Larson (2017) has found that having no recommendation to get a vaccine is mentioned in 20 studies as a reason for vaccine hesitancy. The study conducted by Pot et al. (2017) has found self-efficacy to be significantly

associated with the intention to receive the HPV-vaccine. Parents that discuss HPV-vaccination with their daughter have a higher intention to get their daughter vaccinated with the HPV-vaccine, the respondents have a mean of 2.28 (on a Likert-scale from 1-7) and a standardized ß of 0.67. Parents that discuss HPV-vaccination with their partner have a higher intention to get their daughter vaccinated with the HPV-vaccine, the respondents have a mean of 3.67 (on a Likert-scale from 1-7) and a standardized ß of 0.74 (Pot et al., 2017). This could be interpreted as the intention of parents to let their daughter get the HPV-vaccine is higher among parents who discuss HPV-vaccination with their partner and daughter. The study conducted by Donkers et al. (2015) has found that the cues-to-action to be significantly associated with the willingness to receive the MMR-vaccine. Students who agree that their significant others think that it is important that they get the MMR-vaccine have an OR of 1.66 in comparison to students who disagree that their significant others think that it is important that they get the MMR-vaccine (Donkers et al., 2015).

Table 5 gives an overview of the effect of the modifying factors of the HBM on the uptake of and intention to receive vaccines. The criteria in which the effect size (big/small/none) is determined are shown in Appendix VI.

Table 5: Overview of concepts and studies.

Study / modifying factor	**Alberts et al. (2017).**	**Blagden et al. (2017).**	**Karakafillas & Larson. (2017).**	**Pot et al. (2017).**	**Donkers et al. (2015).**	**van Lier et al. (2014).**
Outcome Variable	Uptake & intention	Uptake	Vaccine hesitancy	Uptake & intention	Willingness	Uptake
Susceptibility	**Intention: Big effect	**Big Effect	Big effect	None	**Big effect	None
Severity	None	None	Big effect	None	**Big effect	None
Benefits	**Intention: Big effect	**Big Effect	Big effect	**Intention: Small effect	**Big effect	None
Barriers	None	None	Big effect	**Intention: Small effect	None	None
Cues-to-action	None	None	Big effect	**Intention: Big effect	**Big effect	None
Self-efficacy	None	None	None	None	None	None

* Effect was found in bivariate analysis.
** Effect was found in multivariate analysis.

2.2.3: Conclusion Mini-review

This mini-review answers the following sub-question: *'What is the current knowledge on modifying factors and concepts of the Health Belief Model that influence the uptake of and intention to receive vaccines?*'. This section will summarize the findings from sections 2.2.1 and 2.2.2 in order to answer the sub-question.

The mini-review has shown that different modifying factors of the HBM influence the uptake of and intention to receive vaccines:

- Age influences the uptake of vaccines. The uptake of a vaccine is higher among younger students (18 years old) in comparison to older students (19 years and older) (Blagden et al., 2017).
- Gender is not found to be influential on the uptake of and intention to receive vaccines.
- Ethnic background influences the uptake of and intention to receive vaccines. The uptake of and intention to receive vaccines is higher among children whose parents have a Dutch ethnic background in comparison to children of whom one or both parents are born in another (non-Western) country (van Lier et al., 2014; Alberts et al., 2017).
- Religion influences the uptake of and intention to receive vaccines. The uptake of childhood vaccines is lower in communities with a higher religious objection to vaccination (van Lier et al., 2014). The intention of parents to get their daughter vaccinated is lower among parents

who are religious in comparison to parents who do not belong to a religion (Alberts et al., 2017).
- Personality is not found to be influential on the uptake of and intention to receive vaccines.
- Socio-economic factors influence the uptake of and intention to receive vaccines. The uptake of childhood vaccines is higher in postcode areas with high socioeconomic status (van Lier et al., 2014). The intention of parents to get their daughter vaccinated is lower among parents with a low educational level in comparison to parents with an intermediate or high educational level (Alberts et al., 2017).
- Knowledge influences the uptake of and intention to receive vaccines. A lack of knowledge is associated with vaccine hesitancy, and thus, the uptake of and intention to receive vaccines (Karakafillas & Larson, 2017).
- Childhood vaccination status influences the uptake of vaccines. A full childhood vaccination status is associated with a higher uptake of vaccines in adolescents (Alberts et al., 2017).

The mini-review has shown that different concepts of the HBM influence the uptake of and intention to receive vaccines:
- Perceived susceptibility influences the uptake of and intention to receive vaccines. The uptake of vaccines is higher among students who perceive themselves knowledgeable about the risk on a VPD (Blagden et al., 2017). The intention of parents to get their daughter vaccinated and the willingness of students to be vaccinated increases when there is a higher perceived susceptibility (Alberts et al., 2017; Donkers et al., 2015). The perceived low risk of contracting VPDs is associated with vaccine hesitancy, and thus, the uptake of and intention to receive vaccines (Karakafillas & Larson, 2017).
- Perceived severity influences the uptake of and intention to receive vaccines. The intention of students to be vaccinated increases with higher perceived severity (Donkers et al., 2015). A lower perceived severity is associated with vaccine hesitancy, and thus, the uptake of and intention to receive vaccines (Karakafillas & Larson, 2017).
- Perceived benefits influence the uptake of and intention to receive vaccines. The uptake of vaccines is higher among students that have higher perceived benefits (Blagden et al., 2017). The intention of parents to get their daughter vaccinated and the willingness of students to be vaccinated increases when there are higher perceived benefits (Alberts et al., 2017; Pot et al., 2017; Donkers et al., 2017). Lower perceived benefits are associated with vaccine hesitancy, and thus, the uptake of and intention to receive vaccines (Karakafillas & Larson, 2017).
- Perceived barriers influence the uptake of and intention to receive vaccines. The intention of parents to get their daughter vaccinated decreases when the perceived barriers increase (Pot et al., 2017). Higher perceived barriers are associated with vaccine hesitancy, and thus, the uptake of and intention to receive vaccines (Karakafillas & Larson, 2015).
- Cues-to-action influence the uptake of and intention to receive vaccines. The intention of parents to get their daughter vaccinated and the willingness of students to be vaccinated increases when cues-to-action are experienced (Pot et al., 2017; Donkers et al., 2015). Having no recommendation to get a vaccine is associated with vaccine hesitancy, and thus, with the uptake of and intention to receive vaccines (Karakafillas & Larson, 2017).
- Self-efficacy is not found to be influential on the uptake of and intention to receive vaccines.

The findings of the mini-review will be used to form hypotheses, shown in paragraph 2.4, to answer the next, adjusted, sub-question: '*What modifying factors and concepts of the HBM influence the uptake of and intention to receive the MenACWY-vaccine by adolescents*?'.

2.3: Hypotheses

This paragraph will describe the hypotheses based on the findings from the mini-review to answer the sub-question: *'What modifying factors and concepts of the HBM influence the uptake of and intention to receive the MenACWY-vaccine by adolescents?*'. The mini-review has found different effects from the modifying factors and concepts of the HBM on the uptake of vaccines and the intention to receive vaccines. The hypotheses for the uptake and intention are different. The hypotheses can be found in Table 6.

Table 6: Hypotheses

#	Hypotheses
Uptake: modifying factors	
1	Age: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among younger adolescents compared to older adolescents.
2	Ethnic background: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with two Dutch parents compared to adolescents of whom one or more parent is not Dutch.
3	Religion: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with parents who do not belong to a church compared to adolescents whose parents belong to a church.
4	Socio-economics: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with parents that have an intermediate or high level of education compared to adolescents whose parents have a low educational level.
5	Knowledge: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the reported level of knowledge about meningococcal to choose whether or not they want to receive the MenACWY-vaccine increases.
6	Childhood vaccination status: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents that have received all childhood vaccines compared to adolescents that have not received all childhood vaccines.
Uptake: concepts	
7	Perceived susceptibility: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the perceived susceptibility of meningococcal disease increases.
8	Perceived severity: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the perceived severity of meningococcal disease increases.
9	Perceived benefits: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the perceived benefits of meningococcal disease increases.
10	Perceived barriers: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the perceived barriers of meningococcal disease decreases.
11	Cues-to-action: The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the cues-to-action increase.
Intention: modifying factors	
12	Ethnic background: The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with two Dutch parents compared to adolescents of whom one or more parent is not Dutch.
13	Religion: The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with parents who do not belong to a church compared to adolescents whose parents belong to a church.
14	Socio-economics: The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with parents that have an intermediate or high level of education.
15	Knowledge:

	The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher as the reported level of knowledge about meningococcal to choose whether or not they want to receive the MenACWY-vaccine increases.
Intention: modifying factors	
16	Perceived susceptibility: The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher when the perceived susceptibility of meningococcal disease increases.
17	Perceived severity: The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher when the perceived severity of meningococcal disease increases.
18	Perceived benefits: The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher when the number/amount of perceived benefits of meningococcal disease increase.
19	Perceived barriers: The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher when the number/amount of perceived barriers of meningococcal disease decrease.
20	Cues-to-action: The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher when the number/amount of cues-to-action increase.

3. Methodology

In the previous chapter, a theoretical framework was used, and knowledge was derived about the factors that influence the uptake of and intention to receive vaccines, and hypotheses were formed to the next sub-question: '*What modifying factors and concepts of the HBM influence the uptake of and intention to receive the MenACWY-vaccine by adolescents*?'. This chapter will provide the study design, setting, data collection, study population, data analyses, and ethical approval to answer the aforementioned sub-question and research question 2: *'Where do adolescents look for information, how would adolescents like to receive information, and what information about vaccine-preventable diseases would adolescents like to receive*?'.

3.1: Study Design

A quantitative research method was used in this study. The quantitative study design was used in order to answer the research question: cross-sectional. A cross-sectional study design is carried out at one-time point or a short period (Levin, 2006). The cross-sectional study design is chosen as it represents a large sample of the population, is to be conducted in a short period, and because of the possibility to explore associations between dependent and independent variables for further research (Mann, 2003; Levin, 2006).

3.2: Setting

This study was conducted among adolescents who were following secondary education in the Netherlands in 2019. The sample was recruited through high school teachers that were willing to have their students participating in this study. The high school teachers were approached through e-mail with information about this study and the question of whether they wanted to participate or not. Once the teachers accepted to participate in this study, they received information about when to expect the informed consent for the parents and the link to the questionnaire. The schools that participated in this study are located in the middle and east of the Netherlands. The school that is located in the middle of the Netherlands had a student population of 2,300-2,400 students in 2018, the educational levels that are offered: 'VMBO-B', 'VMBO-K', 'VMBO-T', 'HAVO', 'VWO-A', and 'VWO-G'. The school that is located in the east of the Netherlands had a student population of 1,000-1,100 students in 2018, the educational levels that are offered: 'VMBO-T (MAVO)', 'HAVO', 'VWO-A', and 'VWO-G'.

3.3: Data collection

This paragraph describes the data collection to determine the modifying factors and concepts of the HBM that influence the uptake of and intention of adolescents to receive the MenACWY-vaccine, and to determine the preference of students in the provision of information.

Data was collected using a questionnaire that consisted of 27 questions. The questionnaire can be found in Appendix VI, and the operationalization of the questionnaire can be found in Appendix IX. The questionnaire was based on the questionnaires used in the study that was conducted by Blagden et al. (2017) and on a survey used by the RIVM (2018-b). The survey used by the RIVM was retrieved through mail contact with a senior epidemiologist of the RIVM. The survey was used in the surveillance and development report of 2018 to investigate the organizational preferences of adolescents and their parents to receive the MenACWY-vaccine. (Personal Communication, March 12, 2019).

The dependent variables measured in the questionnaire: the uptake of the MenACWY-vaccine, and the intention to receive the MenACWY-vaccine. The dependent variables were asked to the students in three questions. The uptake of the MenACWY-vaccine was determined by asking whether the student has received an invitation to receive the MenACWY-vaccine in 2018/2019 and by asking whether he/she has received the MenACWY-vaccine. The intention was determined by asking the students that did not receive the MenACWY-vaccine whether the student has the intention to receive the MenACWY-vaccine in 2018/2019 on a five-point Likert scale (no, probably not, in doubt, probably

yes, and yes). The visualization of how the uptake and intention are determined can be seen in Figure 6. The numbers that are shown in **bold** represent the numbers that were used to determine the uptake and intention.

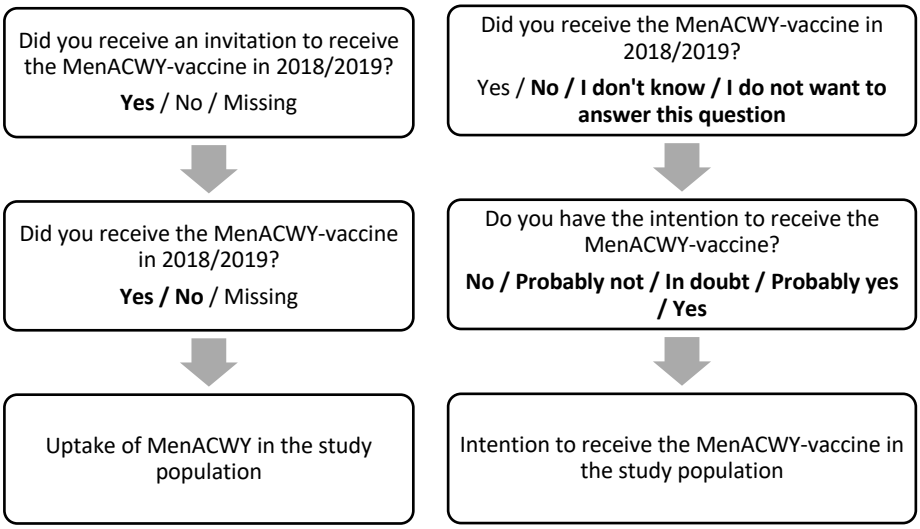

Figure 6: Dependent variables: uptake and intention to receive the MenACWY-vaccine

The independent variables measured in the questionnaire were based on the modifying factors and the concepts of the HBM. The independent variables related to the modifying factors of the HBM were asked to the students in 11 questions. Age was determined by asking students for their age in a multiple choice question ranging from 13 to 18+ years old. The migration background was determined using two multiple choice questions; students were asked to report the migration background of themselves and their parents. Migration background was then determined based on the classification from the Statistics Netherlands, 'Dutch' and 'First- and second generation immigrant' (CBS, 2016). Religion was determined by asking about the religion of the student and both of their parents. Two multiple choice questions were used to determine the religion, the following categories were in the multiple choice questions: 'No religion', 'Re-reformed', 'Islam', and 'Other, Roman-Catholic, and Protestant'. Socio-economics was determined by asking about the educational level of the students and their parents. The educational level of the students was determined by asking students for their educational level in a multiple choice question consisting of the following categories: 'VMBO-T'[2], 'HAVO'[3], and 'VWO'[4]. The highest educational level of the household was determined by asking the students about the educational level of both parents in a multiple choice question consisting of the following categories according to the classification of the Statistics Netherlands (CBS, 2019-a): 'Low' (basic-education, and VMBO[5]), 'Intermediate' (HAVO, VWO, MBO[6]), and 'High' (HBO, university degree[7]). Knowledge was determined by asking about the agreement of students with a statement about their knowledge about meningococcal to make a choice whether or not they want to receive

[2] VMBO-T is comparable to secondary education in the United Kingdom with 6 courses valued from D-G or 3-1. In the United States, VMBO-T is comparable to general educational development (Nuffic, 2018-a; Nuffic, 2018-b).
[3] HAVO is comparable to secondary education in the United Kingdom with 4 courses valued from A-C or 9-4 added with 2 courses on *advanced subsidiary level*. In the United States, HAVO is comparable to a high school diploma (Nuffic, 2018-a; Nuffic, 2018-b).
[4] VWO is comparable to secondary education in the United Kingdom with 3 courses valued from A-C or 9-4 added with 3 courses on *advanced subsidiary level*. In the United States, VWO is comparable to a high school diploma (Nuffic, 2018-a; Nuffic, 2018-b).
[5] Basic education and VMBO are comparable to primary education and a general certificate of secondary education with 4 courses valued from D-G or 3-1 in the United Kingdom. In the United States, it is comparable with primary education and general educational development diploma (Nuffic, 2018-a; Nuffic, 2018-b).
[6] HAVO, VWO, and MBO are comparable to the general certificate of secondary education with 4 courses valued from A-C or 9-4 and 2 courses on *advanced subsidiary level* or with 3 courses valued from A-C added with 3 courses on *advanced subsidiary level*, and the BTEC Level 3 (Extended) Diploma in the United Kingdom. In the United States, it is comparable to a high school diploma and an associate's degree (terminal/vocational program) (Nuffic, 2018-a; Nuffic, 2018-b).
[7] HBO and university are comparable to a honours bachelor degree, a master of Science/Arts/Philosophy in the United Kingdom. In the United States, it is comparable to a bachelor's or master's degree (Nuffic, 2018-a; Nuffic, 2018-b).

the MenACWY-vaccine on a five-point Likert-scale: 'Fully disagree', 'Partly disagree', 'Neither agree nor disagree', 'Partly agree', and 'Totally disagree'.

The independent variables related to the concepts of the HBM were asked to the students in 11 questions. These 11 questions are all based on a five-point Likert-scale as students had to give their opinion about different statements related to the concepts of the HBM. Perceived susceptibility was determined by asking how big students perceive the chance that they will get meningococcal disease if they do not receive the MenACWY-vaccine on a five-point Likert-scale: 'Very small', 'Small', 'Neither big nor small', 'Big', and 'Very big'. Perceived severity was determined by asking how severe students think meningococcal disease is on a five-point Likert-scale: 'Not severe', 'Slightly Severe', 'Averagely severe', 'seriously severe', and 'very severe'. Perceived benefits were determined using three questions. Students were asked two questions about their opinion on vaccines in general and about their opinion on vaccinating adolescents for meningococcal disease on a five-point Likert-scale: 'Very bad', 'Bad', 'Neither good nor bad', 'Good', and 'Very good'. The third question asked students how big they perceive the chance that they will get meningococcal disease if they receive the MenACWY-vaccine on a five-point Likert-scale: 'Very small', 'Small', 'Neither big nor small', 'Big', and 'Very big'. Perceived barriers were determined using two questions, students were asked about how big they perceive the chance that they will experience side-effects after the MenACWY-vaccine is injected, and how big they perceive the chance that the MenACWY-vaccine injection is painful on a five-point Likert scale: 'Very small', 'Small', 'Neither big nor small', 'Big', and 'Very big'. The effect of cues-to-action is determined using three questions. Students were asked about whether they think that their parents think that he/she has to get the MenACWY-vaccine, whether they think that their friends/classmates will get the MenACWY-vaccine on a five-point Likert-scale: 'Totally disagree', 'Partly disagree', 'Neither agree nor disagree', 'Partly agree', and 'Totally disagree'.

The independent variable to determine the vaccination status of the student for childhood vaccines was asked to the students using a multiple choice question. Students were asked to report their participation to the NIP in the following categories: 'Not at all', 'Yes, partly', and 'Yes, fully'.

The preference of students in the provision of information was determined using three multiple choice questions, students could choose multiple answers. The first question asked the student where they would look for information with the following categories: 'Internet pages', 'Social media', 'Parents/guardians', 'Friends', 'Classmates/teacher', 'Doctor/nurse', 'I do not look for information about vaccines', and 'Other, namely:'. The second question asked the students how they would like to be informed about vaccines with the following categories: 'Folder/letter', 'Website', 'Social media', 'During class', 'Information session at school', 'Information session outside school', 'Digital choice-aid', 'App', 'Government-campaign', 'Talk with doctor/nurse', 'Parents/Guardians', 'I do not need information, I know that I want to receive vaccines', 'I do not need information, I know that I do not want to receive vaccines', and 'Other, namely'. The third question asked the students what information they would like to have about a VPD if a vaccine is offered to them with the following categories: 'Susceptibility of adolescents with the VPD', 'Number of patients, hospital admissions, and death among adolescents', 'Symptoms of VPD among adolescents', 'Content of vaccine', 'Effectiveness of vaccine in preventing VPD', 'Experience of other adolescents', 'Experience in other countries', 'Available research on the VPD', 'No information', and 'Other, namely'. The operationalization of the data retrieved using the questionnaire is shown in Appendix VII.

In order to reduce the occurrence of missing values, students were either obliged to answer a question and had the opportunity to choose the 'I do not want to answer this question' or were given a warning when a question was not filled in (completely). Missing values within the dependent and independent variables were not analyzed. Students had the opportunity to give the answers; 'I don't know' and 'I don't want to answer this question'. Both answers are considered as missing values.

A pilot was conducted in which the questionnaire was completed by five children/adolescents that were not related to the studied population. The aim of this pilot was to determine the duration time, and to improve the comprehensibility of the questionnaire. The feedback that was obtained from this pilot was used to change questions that were reported as (too) difficult or unclear.

The Data Management Plan (DMP) is shown in Appendix VIII. The DMP is created using the research data policy from the University of Twente (2015).

3.4: Study Population

This paragraph shows the inclusion criteria of students in the studied population, recruitment and response of the students, the descriptive statistics of the populations used for analysis of the uptake and intention, and background characteristics of the studied population in both dependent variables. The characteristics of the respondents were explored using univariate analysis using frequencies.

3.4.1: Inclusion and exclusion criteria

The eligibility of students is assessed using seven criteria; students who did not meet these criteria have not filled in the questionnaire. Students could fill in the questionnaire when education was followed at one of the participating schools, the educational level ranged from 'Praktijkonderwijs' to 'VWO-G', the students are aged 14-19 years old, students are able to complete the survey in Dutch, the parents/guardians of students younger than 16 years old did not object to their child participating in this study, the students did not object to participating in this study, and students have accepted that participation is voluntary.

3.4.2: Recruitment and Response

Students were recruited through two participating high schools in the Netherlands. Before the students were approached to fill in the questionnaire, all parents/guardians have received an informed consent letter at least one week prior to the start of the data collection. No parents/guardians have given their objection to their child participating in this study. The questionnaire was distributed to students using Qualtrics.[XM] that was provided by the University of Twente. The students could access the questionnaire online through an anonymous link that was provided by the teacher from the participating school. The students were able to complete the questionnaire on their mobile phones and their laptops. One school has distributed the link to the questionnaire to the students through class-mentors, and the other school has distributed the link to the questionnaire through a digital learning environment. In total, 618 students have received the link to the questionnaire. In total, 301 students have opened in the questionnaire in the period from 15 April to 19 April 2019. The response rate was 48.7% (301/618).

The responses of the students were checked using (visual) inspection of the retrieved data on the following criteria; the questionnaire must be filled in completely, as to be seen in the 'finished' column provided by Qualtrics, the characteristics-section must be filled in completely and the respondents have to report that they follow their education in the participating schools. After these criteria were applied, 242 responses were found eligible for analyses.

3.4.3: Uptake of the MenACWY-vaccination

The uptake of the MenACWY-vaccine was determined based on whether the student reported to have received an invitation to get the MenACWY in 2018/2019 and whether the student has responded 'yes'/'no' to whether the MenACWY-vaccine was received in 2018/2019.

As to be seen in Figure 7, of all 242 students, 55.4% (n=134) reported that they received an invitation to get the MenACWY-vaccine, 27.7% (n=67) has reported that they did not receive an invitation to get the MenACWY-vaccine, and 16.9% (n=41) of the students did not want to answer the question or did not know whether they received an invitation to get the MenACWY-vaccine. Of all 134 students that have reported to have received an invitation to the MenACWY-vaccine, 74.6% (n=100) has received the MenACWY-vaccine, 20.1% (n=27) did not receive the MenACWY-vaccine, and 5.2% (n=7) did not want to answer the question or did not know whether the MenACWY-vaccine was received. The reported uptake of the sample of the MenACWY-vaccine in the catch-up campaign is 78.7% (n=100/n=127).

Did you receive an invitation to receive the MenACWY-vaccine in 2018/2019? (N=242)		Did you receive the MenACWY-vaccine in 2018/2019? (N=134)		Reported uptake of MenACWY in the study population (N=127)
• **Yes:**	**55.4% (N=134)**	• **Yes:**	**74.6% (N=100)**	• 100/127= 78.7%
• No:	27.7% (N=67)	• **No:**	**20.1% (N=27)**	
• Missing:	16.9% (N=41)	• Missing:	5.2% (N=7)	

* The numbers that are shown in **bold** represent the numbers that were used to determine the uptake.
Figure 7: Reported uptake of MenACWY-vaccine in 2018/2019.

The background characteristics of population in which the uptake was studied is shown in Table 7. As seen in the section before, the reported uptake is determined based on 127 students.

Table 7: Background characteristics of population in which the uptake was studied

	N	**%**
Total:	127	100
Participation in the NIP		
Yes, fully	85	66.9
Yes, partly	19	15.0
No	6	4.7
Missing	17	13.4
School		
1	21	16.5
2	106	83.5
Age		
14	22	17.3
15	15	11.8
16	41	32.3
17	39	30.7
18+	10	7.9
Gender		
Male	53	41.7
Female	74	58.3
Level of education: Adolescent		
VMBO-T	9	7.1
HAVO	74	58.3
VWO	44	34.6
Level of education: Household		
Low	11	15.3
Intermediate	24	23.6
High	83	45.0
Missing	9	7.1
Religion: Adolescent		
None	69	54.3
Re-reformed	17	13.4
Islam	14	11.0
Other / RC / Reformed	27	21.3
Religion: Father		
None	64	50.4
Re-reformed	15	11.8
Islam	14	11.0
Other / RC / Reformed	29	22.8
Missing	5	3.9
Religion: Mother		
None	60	47.2
Re-reformed	15	11.8

Islam	14	11.0
Other / RC / Reformed	31	24.4
Missing	7	5.5
Migration Background		
Dutch	91	71.7
1st/2nd gen.	34	26.8
Missing	2	1.6

Table 7 shows the frequencies of background characteristics of the students on whom the reported uptake was determined. The reported participation in the NIP: 67% of the respondents has been fully vaccinated, 15% has been partly vaccinated, and 5% has not have received any vaccines in the NIP. The mean age of the students: 16 years old. The reported level of education of the respondents: 7% follows 'VMBO-T', 58% follows 'HAVO', and 35% follows 'VWO'. The reported highest completed educational level of the parents of the respondent: 15% low level of education, 24% intermediate level of education, and 45% high level of education. The reported religion of the students: 54% is unreligious, 13% belongs to re-reformed, 11% belongs to Islam, and 21% belongs to another/ the roman-catholic/ the reformed church. The reported religion of the parents: unreligious father 50% and mothers 47%; re-reformed fathers and mothers 12%; Islamic fathers and mothers 11%; fathers that belong to another/roman-catholic/reformed church 23% and mothers 24%. The reported migration background of the respondents: 72% is Dutch and 27% is a first- or second generation immigrant.

3.4.4: Intention to receive the MenACWY-vaccine

The intention to receive the MenACWY-vaccine in 2018/2019 in the sample of 242 students is determined by asking the students that did not receive the MenACWY-vaccine whether the student has the intention to receive the MenACWY-vaccine in 2018/2019.

As to be seen in Figure 8, of all 242 students, 42.6% has reported that they did not receive the MenACWY-vaccine, and 12% (n=29) did not want to answer the question or did not know whether the MenACWY-vaccine was received. The intention was asked to 139 students in total. Of all 139 students, 11% does not have the intention to receive the MenACWY-vaccine, 11% would probably not intent to receive the MenACWY-vaccine, 17% is in doubt whether they would intent to receive the MenACWY-vaccine, 28% would probably intent to receive the MenACWY-vaccine, and 34% would intent to receive the MenACWY-vaccine. The mean intention of students that did not receive the MenACWY-vaccine to receive the MenACWY-vaccine was 2.63 (SD: 1.34) on a five-point Likert-scale (0-4).

Did you receive the MenACWY-vaccine in 2018/2019? (N=242)	
• Yes:	42.6% (N=103)
• **No:**	**45.5% (N=110)**
• **Missing:**	**12% (N=29)**

Do you have the intention to receive the MenACWY-vaccine? (N=139)	
•Mean Intention:	2.63 (SD: 1.336)
•(0) No:	10.8% (n=15)
•(1) Probably not:	10.8% (n=15)
•(2) In doubt:	16.5% (n=23)
•(3) Probably yes:	28.1% (n=39)
•(4) Yes:	33.8% (n=47)

* The numbers that are shown in **bold** represent the numbers that were used to determine the intention.

Figure 8: Intention to receive the MenACWY-vaccine of students who did not receive the MenACWY-vaccine.

The background characteristics of the population in which the intention was studied is shown in Table 8. As seen in the section before, the reported intention is determined based on 139 students.

Table 8: Background characteristics of population in which the intention was studied

	N	%
Total:	139	100
Participation in the NIP		
Yes, fully	63	45.3
Yes, partly	36	25.9
No	13	9.4
Missing	25	19.4
School		
1	34	24.5
2	105	75.5
Age		
14	10	7.2
15	52	37.4
16	41	29.5
17	16	11.5
18+	20	14.4
Gender		
Male	54	38.8
Female	85	61.2
Level of education: Adolescent		
VMBO-T	17	12.2
HAVO	94	67.6
VWO	28	20.1
Level of education: Household		
Low	18	12.9
Intermediate	37	26.6
High	67	48.2
Missing	17	12.2
Religion: Adolescent / Father / Mother		
None	64	46.0
Re-reformed	26	18.7
Islam	22	15.8
Other / RC / Reformed	27	19.4
Religion: Father		
None	58	41.7
Re-reformed	27	19.4
Islam	24	17.3
Other / RC / Reformed	24	17.3
Missing	6	4.3
Religion: Mother		
None	54	38.8
Re-reformed	27	19.4
Islam	23	16.5
Other / RC / Reformed	28	20.1
Missing	7	5
Migration Background		
Dutch	90	64.7
1st/2nd gen.	48	34.5
Missing	1	0.7

Table 8 shows the frequencies of background characteristics of the students on whom the reported intention was determined. The reported participation in the NIP: 45% of the respondents has been fully vaccinated, 36% has been partly vaccinated, and 13% has not have received any vaccines in the NIP. The mean age of the students: 15.9 years old. The reported level of education of the respondents: 12% follows 'VMBO-T', 68% follows 'HAVO', and 20% follows 'VWO'. The reported highest completed educational level of the parents of the respondent: 13% low level of education, 27% intermediate level of education, and 48% high level of education. The reported religion of the students: 46% is unreligious, 19% belongs to re-reformed, 16% belongs to Islam, and 19% belongs to another/ the roman-catholic/

the reformed church. The reported religion of the parents: unreligious father 42% and mothers 39%; re-reformed fathers and mothers 19%; Islamic fathers and mothers 17%; fathers that belong to another/roman-catholic/reformed church 17% and mothers 20%. The reported migration background of the respondents: 65% is Dutch and 35% is a first- or second generation immigrant.

3.5: Data Analysis

The responses to the questionnaire were retrieved from Qualtrics and uploaded for analysis into IBM SPSS Statistics Version 25. The responses that were given to the Likert-scale questions are assumed to be normally distributed according to the central limit theorem. Field (2013: p. 170) states that the central limit theorem means that there are a variety of situations in which normality can be assumed regardless of the shape of the sample data. A situation in which normality can be assumed is when there is a large sample size (Field, 2013). Bivariate analysis was performed differently for both dependent variables as the uptake is a discrete binary dependent variable and the intention (Likert-scale) is a continuous dependent variable.

The bivariate analysis for the dependent variable uptake was done using the One-Way Analysis of Variance (ANOVA) and the Spearman-Correlation. The ANOVA was used to test whether there is a significant association between the dependent variable uptake and the modifying factors from the HBM. The Spearman-Correlation was used to test the association between the dependent variable uptake and the concepts from the HBM (Likert-scale).

The bivariate analysis for the dependent variable intention was done using the ANOVA and the Spearman-Correlation. The ANOVA was used to test the association between dependent variable intention and the modifying factors from the HBM. The ANOVA is calculated based on the mean Likert-score (on the dependent variable intention) that was given by different groups (e.g. different categories within the modifying factors). Normally, analysis between a continuous dependent variable and an independent variable comparing two groups should be performed using the unpaired T-test. However, the unpaired T-test and the ANOVA give similar results. For that reason, the ANOVA was used to perform bivariate analysis between intention and the background characteristics. The Spearman-Correlation was used to test the association between dependent variable intention and the concepts from the HBM.

Multivariate analyses were not performed for both dependent variables as there were not enough respondents to perform a reliable multivariate analysis. Future research on this topic should include a bigger number of students and perform multivariate analyses.

The information-questions were analyzed using multi-response. No statistical methods were performed on the results as the research question could be answered using univariate statistics.

The syntax from SPSS Statistics can be found in Appendix IX.

3.6: Ethical Approval

This study required permission from the Ethical Committee of the faculty of Behavior, Management and Social Sciences (BMS) of the University of Twente. Permission has been granted under file number 190240. The studied population consisted of adolescents aged between 14-19. Legally, parents of adolescents younger than 16 years old have to provide their permission on their child participating in a study. Permission was asked in a passive way to the parents of the adolescents, the informed consent letter for the parents can be found in Appendix X. Permission was asked in an active way to the adolescents before the start of the questionnaire, the informed consent for the adolescents can be found in Appendix VI.

4. Results

This chapter will describe the results from the analysis of the data that was retrieved with the questionnaire to answer the third sub-question: *'What modifying factors and concepts of the HBM influence the uptake of and intention to receive the MenACWY-vaccine by adolescents?*' and the second research-question '*Where do adolescents look for information, how would adolescents like to receive information, and what information about vaccine preventable diseases would adolescents like to receive?*'. This chapter will describe the results from the uptake, intention and the preferences in the provision of information.

4.1: Uptake

This paragraph will describe the results from the analyses to determine the influence of the modifying factors and concepts of the HBM on the adolescent' uptake of the MenACWY-vaccine.

4.1.1: Influence of HBM modifying factors on the uptake of the MenACWY-vaccine

Bivariate analysis has been performed to identify the modifying factors that influence the uptake of the MenACWY-vaccine. In Table 9, the means, standard deviations, and p-values of the modifying factors of the HBM on the reported uptake can be found. The mean is based on the category; a '0' represents that no student has received the MenACWY-vaccine, a '1' means that all students have received the MenACWY-vaccine. The presented mean could also be interpreted as the uptake of the MenACWY-vaccine in that category in % (e.g., mean score 0.78 = 78%).

As to be seen in Table 9, the uptake of the MenACWY-vaccine is significantly associated with three modifying factors, namely socio-economics, knowledge, and previous NIP participation. The uptake of the MenACWY-vaccine is not significantly associated with age, gender, religion of the adolescent and his/her parents, migration background, and educational level of the household.

The educational level of the student is significantly associated with the uptake of the MenACWY-vaccine. The uptake of the MenACWY-vaccine is the highest among students that follow the 'VWO' level, followed by students that follow the 'VMBO-T' level, and lowest among students that follow the 'HAVO' level (mean score on uptake: VWO: 0.93; VMBO-T: 0.78; HAVO: 0.70).

The reported agreement with the statement about the perceived level of knowledge is significantly associated with the uptake of the MenACWY-vaccine. The students had to report whether they agree with the statement 'I have a sufficient amount of knowledge about meningococcal disease to make a choice whether I do or do not want to receive the MenACWY-vaccine'. Students that perceive themselves more knowledgeable about meningococcal disease have a higher uptake of the MenACWY-vaccine (mean score on uptake: fully disagree: 0.33; partly disagree: 0.71; neither agree nor disagree: 0.87; partly agree: 0.83; fully agree: 0.86).

Previous NIP participation is significantly associated with the uptake of the MenACWY-vaccine. The uptake of the MenACWY-vaccine is highest among students that have received all childhood vaccines, followed by students that have received some vaccines, and the lowest among students that have received no vaccines in the NIP (mean score on uptake: none: 0.5; partly: 0.63; fully: 0.86).

Table 9: Results bivariate analysis modifying factors and uptake

Variable + category	N	Mean	SD	P-value
Total	127	0.79	0.41	-
Age				0.62
14	22	0.86	0.35	
15	15	0.80	0.41	
16	41	0.78	0.42	
17	39	0.72	0.46	
18+	10	0.90	0.32	
Gender				0.91
Male	53	0.79	0.41	
Female	74	0.78	0.41	
Religion – adolescent				0.46
No religion	69	0.83	0.38	
Reformed	17	0.65	0.49	
Islam	14	0.79	0.42	
Other / RC / Protestant	27	0.78	0.42	
Religion – father				0.81
No religion	64	0.81	0.39	
Reformed	15	0.73	0.46	
Islam	14	0.71	0.47	
Other / RC / Protestant	29	0.76	0.44	
Religion – mother				0.41
No religion	60	0.83	0.38	
Reformed	15	0.67	0.49	
Islam	14	0.79	0.43	
Other / RC / Protestant	31	0.71	0.46	
Migration Background				0.42
NL	91	0.80	0.40	
First/Second Generation	34	0.74	0.45	
Educational level - adolescent				0.01*
VMBO-T	9	0.78	0.44	
HAVO	74	0.70	0.46	
VWO	44	0.93	0.25	
Educational level – household				0.41
Low	11	0.64	0.50	
Intermediate	24	0.83	0.38	
High	83	0.80	0.41	
Knowledge - agreement				0.01*
Fully disagree	9	0.33	0.50	
Partly disagree	17	0.71	0.47	
Neither agree nor disagree	30	0.87	0.35	
Partly agree	35	0.83	0.38	
Fully agree	35	0.86	0.36	
Participation NIP				0.01*
No	6	0.50	0.55	
Partly	19	0.63	0.50	
Fully	85	0.86	0.35	

* Significant (p-value= <0.05)

4.1.2: Influence of HBM concepts on the uptake of the MenACWY-vaccine

Bivariate analysis has been performed to identify the concepts that influence the uptake of the MenACWY-vaccine. In Table 10, the Spearman Correlation coefficient (R) and p-value of the concepts of the HBM on the reported uptake can be found.

As to be seen in Table 10, the uptake of the MenACWY-vaccine is significantly associated with four concepts, namely perceived susceptibility, perceived severity, perceived benefits, and cues-to-action. The uptake of the MenACWY-vaccine is significantly associated with perceived susceptibility. The uptake of the MenACWY-vaccine is not significantly associated with perceived barriers.

The students had to report how big they perceive the chance that they will get meningococcal disease if they do not get vaccinated on a five-point Likert-scale (ranging from very small to very big).

There is a significant and positive correlation between the perceived susceptibility and the uptake of the MenACWY-vaccine (R=0.19). Students who perceive a higher susceptibility to meningococcal disease are associated with a higher uptake of the MenACWY-vaccine.

The uptake of the MenACWY-vaccine is significantly associated with the perceived severity. The students had to report how severe they perceive meningococcal disease on a five-point Likert-scale (ranging from not severe to very severe). There is a significant and positive correlation between the perceived severity and the uptake of the MenACWY-vaccine (R=0.30). Students who perceive a higher severity of meningococcal disease are associated with a higher uptake of the MenACWY-vaccine.

The uptake of the MenACWY-vaccine in the Netherlands in 2018/2019 in the sample is significantly associated with the perceived benefits. The students had to report their opinion on vaccination in general and the vaccination of adolescents with the MenACWY-vaccine on a five-point Likert-scale (ranging from very bad to very good). There is a significant and positive correlation in the perceived benefits in both the opinion on vaccination in general and the uptake of the MenACWY-vaccine (R=0.24) and the opinion on vaccinating adolescents with the MenACWY-vaccine and the uptake of the MenACWY-vaccine (R=0.41). Students who perceive more benefits from vaccines and the MenACWY-vaccine are associated with a higher uptake of the MenACWY-vaccine.

The uptake of the MenACWY-vaccine in the Netherlands in 2018/2019 in the sample is significantly associated with the cues-to-action. The students had to report whether their parents think that the respondent has to get the MenACWY-vaccine and whether the respondent thinks that his/her classmates get the MenACWY-vaccine on a five-point Likert scale (ranging from totally disagree to totally agree). There is a significant and positive correlation between the opinion of the parents towards the MenACWY-vaccine and the uptake of the MenACWY-vaccine (R= 0.34). Students who think that their parents think that they should get the MenACWY-vaccine are associated with a higher uptake of the MenACWY-vaccine. Another significant and positive correlation was found between whether the respondent thinks that his/her classmates get the MenACWY-vaccine and the uptake of the MenACWY-vaccine (R=0.22). Students that think that their classmates will get the MenACWY-vaccine are associated with a higher uptake of the MenACWY-vaccine.

Table 10: Results bivariate analysis concepts and uptake. N=127.

Variable	Correlation (R)	P-value
Perceived Susceptibility		
Risk on meningococcal disease if not vaccinated	0.19	0.04*
Perceived Severity		
Severity meningococcal disease	0.30	<0.01*
Perceived Benefits		
Opinion on vaccination in general	0.24	0.01*
Opinion on MenACWY-vaccine among adolescents	0.41	<0.01*
Risk on meningococcal disease if vaccinated	-0.16	0.07
Perceived Barriers		
Chance of side-effects	-0.05	0.59
Chance of pain	-0.10	0.28
Cues-to-Action		
Parents	0.34	<0.01*
Friends	0.11	0.24
Classmates	0.22	0.02*

* Significant (p-value = <0.05)

4.1.3: Conclusion

After the literature study was conducted in chapter 2, hypotheses were formed to answer the sub-question: *'What modifying factors and concepts of the HBM influence the uptake of and intention to receive the MenACWY-vaccine by adolescents?*'. Bivariate analysis has been performed to determine the influence of the modifying factors and concepts of the HBM on the uptake of the MenACWY-vaccine. Table 9 and Table 10 show the means, standard deviations, and p-values of the modifying

factors and the spearman-correlation and p-values of the concepts. Below, the hypotheses that were formed based on the literature review are shown and there will be concluded whether or not the hypothesis is accepted or rejected based on the results from bivariate analyses. Hypotheses that are accepted are shaded in green, and hypotheses that are rejected are shaded in orange.

1	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among younger adolescents compared to older adolescents.**

This hypothesis is rejected. Bivariate analysis has not found a significant association between age and the uptake of the MenACWY-vaccine.

2	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with two Dutch parents compared to adolescents of whom one or more parent is not Dutch.**

This hypothesis is rejected. Bivariate analysis has not found a significant association between migration background and the uptake of the MenACWY-vaccine.

3	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with parents who do not belong to a church compared to adolescents whose parents belong to a church.**

This hypothesis is rejected, bivariate analysis has not found a significant association between religion of the parents and the uptake of the MenACWY-vaccine.

4	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with parents that have an intermediate or high level of education compared to adolescents whose parents have a low educational level.**

This hypothesis is rejected. Bivariate analysis has not found a significant association between educational level of the students' household and the uptake of the MenACWY-vaccine.

5	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the reported level of knowledge about meningococcal to choose whether or not they want to receive the MenACWY-vaccine increases.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the reported level of knowledge and the uptake of the MenACWY-vaccine. Students that perceive themselves more knowledgeable are associated with a higher uptake of the MenACWY-vaccine.

6	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents that have received all childhood vaccines compared to adolescents that have not received all childhood vaccines.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the childhood vaccination status and the uptake of the MenACWY-vaccine. The uptake of the MenACWY-vaccine is highest among students that have received all childhood vaccines, followed by students that have received some vaccines, and the lowest among students that have received no vaccines in the NIP.

7	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the perceived susceptibility of meningococcal disease increases.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the perceived susceptibility and the uptake of the MenACWY-vaccine. Students who perceive a higher susceptibility to meningococcal disease are associated with a higher uptake of the MenACWY-vaccine.

8	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the perceived severity of meningococcal disease increases.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the perceived severity and the uptake of the MenACWY-vaccine. Students who perceive a higher

severity of meningococcal disease are associated with a higher uptake of the MenACWY-vaccine.

9	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the perceived benefits of meningococcal disease increases.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the perceived benefits and the uptake of the MenACWY-vaccine. Students who perceive more benefits from vaccines and the MenACWY-vaccine are associated with a higher uptake of the MenACWY-vaccine.

10	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the perceived barriers of meningococcal disease decreases.**

This hypothesis is rejected. Bivariate analysis has not found a significant association between the perceived barriers and the uptake of the MenACWY-vaccine.

11	**The uptake of the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 increases as the cues-to-action increase.**

This hypothesis is accepted. Bivariate analysis has not found a significant association between cues-to-action and the uptake of the MenACWY-vaccine. Students who think that their parents think that they should get the MenACWY-vaccine are associated with a higher uptake of the MenACWY-vaccine. Students that think that their classmates will get the MenACWY-vaccine are associated with a higher uptake of the MenACWY-vaccine.

4.2: Intention

This paragraph will describe the results from the analyses to determine the influence of the modifying factors and concepts of the HBM on the adolescents' intention to receive the MenACWY-vaccine.

4.2.1: Influence of HBM modifying factors on the intention to receive the MenACWY-vaccine

Bivariate analysis has been performed to identify the concepts that influence the intention to receive the MenACWY-vaccine. In Table 11, the means, standard deviations, and p-values of the modifying factors of the HBM on the reported uptake can be found. The mean is based on the intention measured on a five-point Likert scale (0: no, 1: probably not, 2: in doubt, 3: probably yes, and 4: yes).

As to be seen in Table 11, the intention to receive the MenACWY-vaccine is significantly associated with the ethnic background, knowledge and previous participation in the NIP. The reported religion of the students is significantly associated with the intention to receive the MenACWY-vaccine. The intention to receive the MenACWY-vaccine is not significantly associated with age, gender, and the educational level of the adolescent and his/her parents.

Students without a religion have the highest intention to receive the MenACWY-vaccine, followed by students who belong to the 'reformed' religion, students who belong to the 'another, roman catholic or reformed religion, and the lowest intention is to be found in students that belong to the 'islam' religion (mean score on intention: unreligious: 2.89; 'reformed': 2.88; 'another, roman catholic or reformed': 2.30; 'islam': 2.00). The reported religion of the father of the student is significantly associated with the intention to receive the MenACWY-vaccine. Students whose father belong to the 're-reformed' religion have the highest intention to receive the MenACWY-vaccine, followed by students whose father is unreligious, students whose father belong to the 'another, roman-catholic or reformed' religion, and the lowest intention is to be found in students whose father belongs to the 'islam' religion (mean score on intention: 're-reformed': 3.00; unreligious: 2.91; 'another, roman catholic or reformed': 2.29; 'islam': 1.96). The reported religion of the mother is significantly associated with the intention to receive the MenACWY-vaccine. Students whose mother belong to the 're-reformed' religion have the highest intention to receive the MenACWY-vaccine, followed by students whose mother is unreligious, students whose mother belong to the 'another, roman-catholic or reformed' religion, and the lowest intention is to be found in students whose mother

belongs to the 'islam' religion (mean score on intention: 're-reformed': 3.04; unreligious: 2.94; 'another, roman catholic or reformed': 2.21; 'islam': 2.04).

The students' migration background is significantly associated with the intention to receive the MenACWY-vaccine. The intention to receive the MenACWY-vaccine is higher among students who were born in the Netherlands and whose parents are both born in the Netherlands, compared to students who were born in the Netherlands and whose parents were born abroad or respondents who were born abroad (mean score on intention: NL: 2.84; other than NL: 2.25).

The reported agreement with the statement about the perceived level of knowledge is significantly associated with the intention to receive the MenACWY-vaccine. The students had to report whether they agree with the statement 'I have a sufficient amount of knowledge about meningococcal disease to make a choice whether I do or do not want to receive the MenACWY-vaccine'. Students that perceive themselves more knowledgeable about meningococcal disease are associated with a higher intention to receive the MenACWY-vaccine (mean score of intention: fully disagree: 1.74; partly disagree: 2.76; neither agree nor disagree: 2.56; partly agree: 2.86; fully agree: 3.20).

Table 11: Results bivariate analysis concepts and intention

Variable + category	N	Mean	SD	P-value
Total	139	2.63	1.34	-
Age				0.10
14	10	2.20	1.62	
15	52	2.87	1.22	
16	41	2.78	1.24	
17	16	2.56	1.46	
18+	20	2.00	1.45	
Gender				0.62
Male	54	2.7	1.33	
Female	85	2.59	1.35	
Religion – adolescent				0.02*
No religion	64	2.89	1.30	
Re-Reformed	26	2.88	1.34	
Islam	22	2.00	1.23	
Other / RC / Reformed	27	2.30	1.33	
Religion – father				<0.01*
No religion	58	2.91	1.32	
Re-Reformed	27	3.00	1.18	
Islam	24	1.96	1.27	
Other / RC / Reformed	24	2.29	1.30	
Religion – mother				<0.01*
No religion	54	2.94	1.25	
Re-Reformed	27	3.04	1.19	
Islam	23	2.04	1.22	
Other / RC / Reformed	28	2.21	1.50	
Migration Background				0.01*
NL	90	2.84	1.28	
First/Second Generation	48	2.25	1.38	
Educational level - adolescent				0.49
VMBO-T	17	2.53	1.46	
HAVO	94	2.72	1.30	
VWO	28	2.39	1.40	
Educational level – household				0.09
Low	18	2.00	1.61	
Intermediate	37	2.70	1.22	
High	67	2.78	1.32	
Knowledge – agreement				<0.01*
Fully disagree	23	1.74	1.39	
Partly disagree	17	2.76	1.35	
Neither agree nor disagree	43	2.56	1.20	
Partly agree	29	2.86	1.36	
Fully agree	25	3.20	1.16	

* Significant (p-value = <0.05)

4.2.2: Influence of HBM concepts on the intention to receive the MenACWY-vaccine

Bivariate analysis has been performed to identify the concepts that influence the intention to receive the MenACWY-vaccine. In Table 12, the Spearman Correlation coefficient (R) and p-value of the concepts of the HBM on the reported uptake can be found.

As to be seen in Table 12, the intention to receive the MenACWY-vaccine is significantly associated with the perceived susceptibility, perceived severity, perceived benefits, and cues-to-action. The intention to receive the MenACWY-vaccine is not significantly associated with the perceived barriers.

The intention to receive the MenACWY-vaccine is significantly associated with the perceived susceptibility. The students had to report how big they perceive the chance that they will get meningococcal disease if they do not get vaccinated on a five-point Likert-scale (ranging from very small to very big). There is a significant and positive correlation between the perceived susceptibility and the uptake of the MenACWY-vaccine (R=0.230). Students who perceive a higher susceptibility to meningococcal disease are associated with a higher intention to receive the MenACWY-vaccine.

The intention to receive the MenACWY-vaccine is significantly associated with the perceived severity. The students had to report how severe they perceive meningococcal disease on a five point Likert-scale (ranging from not severe to very severe). There is a significant and positive correlation between the perceived severity and the uptake of the MenACWY-vaccine (R=0.383). Students who perceive a higher severity of meningococcal disease are associated with a higher intention to receive the MenACWY-vaccine.

The reported intention to receive the MenACWY-vaccine is significantly associated with the perceived benefits. The students had to report their opinion on vaccination in general and the vaccination of adolescents with the MenACWY-vaccine on a five-point Likert-scale (ranging from very bad to very good). There is a significant and positive correlation in the perceived benefits in both the opinion on vaccination in general and the uptake of the MenACWY-vaccine (R=0.429) and the opinion on adolescents vaccination and the uptake of the MenACWY-vaccine (R=0.567). Students who perceive more benefits from vaccines and the MenACWY-vaccine are associated with a higher intention to receive the MenACWY-vaccine.

The reported intention to receive the MenACWY-vaccine is significantly associated with the cues-to-action. The student had to report whether their parents think that the student has to get the MenACWY-vaccine and whether the student thinks that his/her friends/classmates get the MenACWY-vaccine on a five-point Likert scale (ranging from totally disagree to totally agree). There is a significant and positive correlation between the opinion of the parents towards the MenACWY-vaccine and the intention to receive the MenACWY-vaccine (R= 0.659). Students who think that their parents think that they should get the MenACWY-vaccine are associated with a higher intention to receive the MenACWY-vaccine. Other significant and positive correlations were found between whether the respondent thinks that his/her friends get the MenACWY-vaccine and the intention to receive the MenACWY-vaccine (R=0.475) and between whether the respondent thinks that his/her classmates get the MenACWY-vaccine and the intention to receive the MenACWY-vaccine (R=0.424). Students that think that their friends/classmates will get the MenACWY-vaccine are associated with a higher intention to receive the MenACWY-vaccine.

Table 12: Results bivariate analysis concepts and intention. N=139.

Variable	Correlation (R)	P-value
Perceived Susceptibility		
Risk on meningococcal disease if not vaccinated	0.23	<0.01*
Perceived Severity		
Severity meningococcal disease	0.38	<0.001*
Perceived Benefits		
Opinion on vaccination in general	0.43	<0.01*
Opinion on MenACWY-vaccine among adolescents	0.57	<0.01*
Risk on meningococcal disease if vaccinated	-0.12	0.17
Perceived Barriers		
Chance of side-effects	-0.13	0.12
Chance of pain	0.03	0.71
Cues-to-Action		
Parents	0.66	<0.01*
Friends	0.48	<0.01*
Classmates	0.42	<0.01*

* Significant (p-value= <0.05)

4.2.3: Conclusion

After the literature study was conducted in chapter 2, hypotheses were formed to answer the sub-question: *'What modifying factors and concepts of the HBM influence the uptake of and intention to receive the MenACWY-vaccine by adolescents?*'. Bivariate analysis has been performed to determine the influence of the modifying factors and concepts of the HBM on the intention to receive the MenACWY-vaccine. Table 11 and Table 12 show the means, standard deviations, and p-values of the modifying factors and the spearman-correlation and p-values of the concepts. Below, the hypotheses that were formed are shown and will conclude whether or not the hypothesis is accepted or rejected based on the results from bivariate analyses. Hypotheses that are accepted are shaded in green, and hypotheses that are rejected are shaded in orange.

12	**The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with two Dutch parents compared to adolescents of whom one or more parent is not Dutch.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the migration background and the intention to receive the MenACWY-vaccine. The intention to receive the MenACWY-vaccine is higher among students with a Dutch migration background compared to students who belong to the first- or second generation migration background.

13	**The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with parents who do not belong to a church compared to adolescents whose parents belong to a church.**

This hypothesis is rejected. Bivariate analysis has found a significant association between religion and the intention to receive the MenACWY-vaccine. The intention to receive the MenACWY-vaccine is highest among students whose parents belong to the 're-reformed' church, followed by the students whose parents do not follow a religion, the students whose parents belong to the 'other/roman-catholic/reformed' religion, and finally by the students whose parents belong to the 'Islam' religion.

14	**The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher among adolescents with parents that have an intermediate or high level of education.**

This hypothesis is rejected. Bivariate analysis has not found a significant association between educational level and the intention to receive the MenACWY-vaccine.

15	**The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher as the reported level of knowledge about meningococcal to choose whether or not they want to receive the MenACWY-vaccine increases.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the reported level of knowledge and the intention to receive the MenACWY-vaccine. Students that perceive themselves more knowledgeable are associated with a higher intention of the MenACWY-vaccine.

16	**The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher when the perceived susceptibility of meningococcal disease increases.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the perceived susceptibility and the intention to receive the MenACWY-vaccine. Students who perceive a higher susceptibility to meningococcal disease are associated with a higher intention to receive the MenACWY-vaccine.

17	**The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher when the perceived severity of meningococcal disease increases.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the perceived severity and the intention to receive the MenACWY-vaccine. Students who perceive a higher severity to meningococcal disease are associated with a higher intention to receive the MenACWY-vaccine.

18	**The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher when the perceived benefits of meningococcal disease increases.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the perceived susceptibility and the intention to receive the MenACWY-vaccine. Students who perceive more benefits from vaccines and the MenACWY-vaccine are associated with a higher intention to receive the MenACWY-vaccine.

19	**The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher when the perceived barriers of meningococcal disease decreases.**

This hypothesis is rejected. Bivariate analysis has not found a significant association between perceived barriers and the intention to receive the MenACWY-vaccine.

20	**The intention to receive the MenACWY-vaccine in the catch-up campaign in the Netherlands in 2018/2019 is higher when the cues-to-action increase.**

This hypothesis is accepted. Bivariate analysis has found a significant association between the cues-to-action and the intention to receive the MenACWY-vaccine. Students who think that their parents think that they should get the MenACWY-vaccine are associated with a higher intention to receive the MenACWY-vaccine. Students that think that their friends/classmates will get the MenACWY-vaccine are associated with a higher intention to receive the MenACWY-vaccine.

4.3: Information

This paragraph will describe the results from the analyses to determine the preferences of students regarding the provision of information. The second research question is answered in this paragraph: '*Where do adolescents look for information, how would adolescents like to receive information, and what information about vaccine preventable diseases would adolescents like to receive?*'.

As seen in Table 13, students would look for information about vaccines through multiple sources. Of all students, 69% would look for information on internet pages, 62% would look for information through their parents/guardians, 25% would look for information through a doctor or nurse, and 23% would look for information through their friends. Of all respondents, 22% would not look for information, and 1% of the respondents would look for information elsewhere, namely through folder/brochures and books about immunology.

Students would like to receive information through multiple sources. Of all students, 54% would like to be informed though a folder/letter, 37% would like to be informed through their

parents/guardians, 32% would like to be informed through a website, 25% would like to be informed through a doctor or nurse, and 25% would like to be informed during class. Of all respondents, 18% would not like to be informed about vaccines as they know they want to be vaccinated, and 3% would not like to be informed about vaccines as they know they do not want to be vaccinated. Of all respondents, 1% would like to receive information elsewhere, namely on television.

Students would like to receive different sorts of information about vaccines. Of all students, 67% would like to receive information about the susceptibility to the Vaccine Preventable Disease (VPD), 59% would like to receive information about the risk on side-effects from the vaccine, 58% would like to receive information about the effectiveness of the vaccine in preventing a VPD, 47% would like to receive information about the symptoms of a VPD, 36% would like to receive information about the content of the vaccine, 35% would like to receive information about the number of cases, hospital admissions and deaths, and 33% would like to receive information about the experience of other adolescents with the vaccine. Of all students, 5% would not like to receive information about vaccines, 3% would like to receive other information, namely, the risk of spreading a VPD to other students and how long the vaccine is effective in preventing a VPD.

Table 13: Results Information Questions

Question	N	%
Total:	242	100
Where would you look for information about vaccines?		
Internet Pages	167	69.0
Parents/Guardians	149	61.6
Doctor/Nurse	61	25.2
Friends	56	23.1
Classmates/Teacher	24	9.9
Social Media	6	2.5
I do not look for information	53	21.9
I do not want to answer this question	3	1.2
Other	3	1.2
How would you like to be informed about vaccines?		
Folder/Letter	130	53.7
Parents/Guardians	89	36.8
Website	78	32.2
Talk with Doctor/Nurse	61	25.2
During class	61	25.2
Digital Choice-Aid	28	11.6
Information-session at school	25	10.3
Government campaign	24	9.9
App	20	8.3
Information-session outside school	15	6.2
Social Media	14	5.8
Not, I know that I want to be vaccinated	44	18.2
Not, I know that I do not want to be vaccinated	8	3.3
I do not want to answer this question	4	1.7
Other	3	1.2
What information would you like to receive about vaccines?		
Risk on the VPD	162	66.9
Risk on side-effects from the vaccine	143	59.1
Effectiveness of vaccine in preventing VPD	141	58.3
Symptoms of VPD	113	46.7
Content of the vaccine	86	35.5
Number of cases, hospital admissions and deaths	85	35.1
Available research about the vaccine	80	33.1
Experience of other adolescents with the vaccine	80	33.1
Experience in other countries with the vaccine	26	10.7
I would not like to receive information about vaccines	13	5.4
I do not want to answer this question	9	3.7
Other	8	3.3

* Students were able to give multiple answers to one question.

5. Conclusion and discussion

This chapter will provide the conclusion from this study, the discussion on the results, the strengths and limitations of this study, and finally future recommendations based on the findings of this study.

5.1: Conclusion

The objective of this study was to determine the factors that influence the uptake of the MenACWY catch-up vaccination by adolescents and to give recommendations on how to improve the vaccination coverage for the MenACWY catch-up campaign and future MenACWY-vaccination of adolescents. This study answers two research questions to reach the objective.

The first research-question: '*What factors influence the uptake/intention to be vaccinated with the MenACWY-vaccine in the catch-up campaign by adolescents in the Netherlands in 2018/2019*?'. This research question was answered using a literature study focused on factors that influence the uptake of and intention to receive vaccines, and by conducting a questionnaire based on the Health Belief Model among adolescents to determine the factors that are associated with the uptake of and intention to receive the MenACWY-vaccine.

Multiple factors are associated with the uptake of and the intention to receive the MenACWY-vaccine by adolescents. The uptake of and intention to receive the MenACWY-vaccine is associated with the educational level of the adolescent, religion of the adolescent and his/her parents, migration background, level of knowledge about meningococcal disease, previous participation in the NIP, perceived susceptibility, perceived severity, perceived benefits, and cues-to-action.

Adolescents with the educational level 'VWO' have a higher uptake of the MenACWY-vaccine compared to adolescents with the educational levels 'VMBO-T' or 'HAVO'. Adolescents who are unreligious have a higher intention to receive the MenACWY-vaccine compared to adolescents that belong to the 're-reformed', 'other/roman-catholic', or 'Islam' religion. But, adolescents whose parents follow the 're-reformed' religion have a higher intention to receive the MenACWY-vaccine compared to adolescents whose parents are unreligious or belong to the 'reformed/roman-catholic/Islam' religion. Adolescents without a migration background have a higher intention to receive the MenACWY-vaccine compared to adolescents with a migration background. Adolescents that perceive themselves to be knowledgeable about meningococcal disease have a higher uptake of and intention to receive the MenACWY-vaccine. Adolescents that have received all childhood vaccines have a higher uptake of and intention to receive the MenACWY-vaccine compared to adolescents that have received some childhood vaccines, and adolescents that did not receive any childhood vaccines.

Adolescents with a higher perceived susceptibility have a higher uptake of and intention to receive the MenACWY-vaccine compared to adolescents with a lower perceived susceptibility. Adolescents with a higher perceived severity have a higher uptake of and intention to receive the MenACWY-vaccine compared to adolescents with a lower perceived severity. Adolescents with higher perceived benefits of vaccines in general and the MenACWY-vaccine have a higher uptake of and intention to receive the MenACWY-vaccine compared to adolescents with lower perceived benefits. The uptake of and intention to receive the MenACWY-vaccine increases when the adolescents perceive more cues-to-action; adolescents who perceive that their parents think that they should receive the MenACWY-vaccine and adolescents who think that their friends/classmates will receive the MenACWY-vaccine are associated with a higher uptake of and intention to receive the MenACWY-vaccine.

The second research-question: '*Where do adolescents look for information, how would adolescents like to receive information, and what information about vaccine-preventable diseases would adolescents like to receive*?'. This research question was answered by conducting a questionnaire among adolescents.

Adolescents would look for information about vaccines on internet pages, through their parents/guardians, through a doctor/nurse, and through their friends. Adolescents would like to

receive information through a folder/letter, their parents/guardians, a website, a doctor/nurse, and they would like to receive information in class. Adolescents would like to receive the following information about vaccines: susceptibility to the VPD, the risk on side-effect from the vaccine, the effectiveness of the vaccine in preventing VPDs, the content of a vaccine, information about the number of cases, hospital admissions and deaths, and the experience of other adolescents with the vaccine.

5.2: Discussion

The results from this study correspond with the findings from the literature review on the factors that influence the uptake of and intention to receive vaccines.

The finding that the intention to receive the MenACWY-vaccine is higher among unreligious adolescents corresponds with the findings from Alberts et al. (2017) and van Lier et al. (2014). Alberts et al. (2017) has found that the intention of parents to get their daughter vaccinated is lower among religious parents, van Lier et al. (2014) has found that the full childhood vaccine uptake is lower in municipalities with a high religious objection to vaccination. The findings of the studies mentioned above correspond with the findings from this study; unreligious adolescents have a higher intention to receive the MenACWY-vaccine. However, the intention to receive the MenACWY-vaccine differs slightly between adolescents with religious and unreligious parents. In contrast to the literature review which has found religion to have a big effect on uptake of and intention to receive vaccines.

The finding that the uptake of and intention to receive the MenACWY-vaccine is higher among adolescents who have a Dutch migration background compared to adolescents with a non-Dutch background corresponds with the findings from Alberts et al. (2017) and van Lier et al. (2014). This study and the literature review both show that migration background has a big effect on the uptake of and intention to receive the MenACWY-vaccine and vaccines.

The finding that the uptake of and intention to receive the MenACWY-vaccine is higher among adolescents who perceive themselves more knowledgeable about meningococcal disease corresponds with the findings from Karakafillas & Larson (2017); a lack of information and misunderstandings about vaccines are mentioned in 31 studies as a reason for vaccine hesitancy. Vaccine hesitancy corresponds with the finding as a low level of knowledge about a vaccine is associated with vaccine hesitancy, and thus, a lower perceived knowledge is associated with a lower uptake of and intention to receive a vaccine. This study and the literature review both show a big effect from knowledge on the uptake of and intention to receive the MenACWY-vaccine and vaccines.

The finding that the uptake of and intention to receive the MenACWY-vaccine is higher among adolescents that have received all childhood vaccines compared to adolescents that did not receive all childhood vaccines corresponds with the findings from Alberts et al. (2017); the uptake of a vaccine is higher among adolescents who have received all childhood vaccines compared to adolescents who did not receive all childhood vaccines. This study and the literature review both show a big effect from the childhood vaccine status and the uptake of and intention to receive the MenACWY-vaccine and vaccines.

The finding that the uptake of and intention to receive the MenACWY-vaccine is higher among adolescents that have a higher perceived susceptibility to meningococcal disease corresponds with the findings from Alberts et al. (2017), Blagden et al. (2017), Karakafillas & Larson (2017), and Donkers et al. (2015); the uptake of and intention to receive a vaccine is higher among students and parents when there is a higher perceived susceptibility, and a low perceived risk on a VPD is associated of contracting a VPD is associated with vaccine hesitancy. Vaccine hesitancy corresponds with the finding as a low perceived susceptibility is associated with a lower uptake of and intention to receive a vaccine. This study has shown a small effect of perceived susceptibility on the uptake of and intention to receive the MenACWY-vaccine. The literature review has found a big effect of the perceived susceptibility on the uptake of and intention to receive vaccines.

The finding that the uptake of and intention to receive the MenACWY-vaccine is higher among adolescents that perceive a high severity of meningococcal disease corresponds with the findings from

Donkers et al. (2015) and Karakafillas & Larson; the intention of students to receive a vaccine is associated with higher perceived severity, and a lower perceived severity is associated with vaccine hesitancy. Vaccine hesitancy corresponds with the finding as a low perceived severity is associated with a lower uptake of and intention to receive a vaccine. The literature review has found a big effect of the perceived severity on the uptake of and intention to receive vaccines.

The finding that the uptake of and intention to receive the MenACWY-vaccine is higher among adolescents that perceive more benefits corresponds with the findings from Alberts et al. (2017), Pot et al. (2017), Donkers et al. (2015), and Karakafillas & Larson (2015); the uptake of and intention to receive vaccines is higher among students and parents that have higher perceived benefits, and lower perceived benefits are associated with vaccine hesitancy. Vaccine hesitancy corresponds with the finding as low perceived benefits are associated with a lower uptake of and intention to receive a vaccine. This study and the literature review have both found a big effect of the perceived benefits on the uptake of and intention to receive the MenACWY-vaccine and vaccines.

The finding that the uptake of and intention to receive the MenACWY-vaccine is higher among adolescents that perceive more cues-to-action corresponds with the findings from Pot et al. (2017), Donkers et al. (2015), and Karakafillas & Larson (2017); the uptake of and intention to receive vaccines is higher among parents that experience higher cues-to-action, and having no recommendation is associated with vaccine hesitancy. Vaccine hesitancy corresponds with the finding as a low cue-to-action is associated with a lower uptake of and intention to receive vaccines. The study and the literature review have both found big effects between the cues-to-action and the uptake of and intention to receive the MenACWY-vaccine and vaccines.

The results from this study contradict with the findings from the literature-review.

The finding that age is not significantly associated with the uptake of and intention to receive the MenACWY-vaccine contradicts with the finding from Blagden et al. (2017); the uptake of a vaccine is higher among younger students compared to older students. The implications of this contradictory finding for the interpretation of the results are expected to be limited. Blagden et al. (2017) has tested the association between the uptake of a vaccine to the age of first-year students, who are older than 18 years old. Possibly, seen the difference in studied population the finding from this study could be representative of the studied population.

The finding that the intention to receive the MenACWY-vaccine is higher among adolescents whose parents belong to the 'Re-reformed' religion, followed by adolescents whose parents are unreligious, whose parents belong to the 'Other/Roman-Catholic/Reformed' and 'Islam' religion contradicts with the findings from van Lier et al. (2014); the intention of adolescents to receive the MenACWY-vaccine is highest among adolescents whose parents belong to the 're-reformed' religion. Implications for this study are expected to be limited and are actually seen as an actual representation of the sample; as seen in the study conducted by Spaan et al. (2017), the vaccination coverage among orthodox Protestants (Reformed) is increasing, thus complies with the intention of 're-reformed' adolescents to receive the MenACWY-vaccine. Unexpected was that the intention to receive the MenACWY-vaccine was lowest among adolescents that belong to the 'Islam' religion, future research is necessary to determine the factors that are associated with the uptake of the MenACWY-vaccine among adolescents or whose parents belong to the Islam religion.

The finding that the uptake of the MenACWY-vaccine is higher among adolescents who follow the educational level 'VWO', followed by adolescents who follow the educational levels 'VMBO-T' and 'HAVO' contradicts with the findings from Alberts et al. (2017); parents with an intermediate level of education have a higher intention to get their daughter vaccinated in comparison to parents with a high or low educational level. The implications of this contradictory finding for the interpretation of the results are expected to be limited; the background characteristics are expected to still be representative for the population. Furthermore, the population studied by Alberts et al. (2017) focuses on the parents of adolescents and this study focuses on the adolescents themselves. This could be a reason for the different findings in the influence of educational level on the uptake of and intention to receive the (MenACWY-)vaccine.

The finding that perceived barriers are not significantly associated with the uptake of and intention to receive the MenACWY-vaccine contradicts with the findings from Pot et al. (2017) and Karakafillas & Larson (2017); students that perceive higher barriers are associated with a lower intention to receive a vaccine, and perceived barriers are associated with vaccine-hesitancy. The implication of this finding for the interpretation of the results is expected to be limited. The finding from this study concluded that adolescents perceive other factors more important than the perceived barriers.

5.3: Strengths and limitations

The findings of this study should be considered in light of the limitations and strengths.

There are three limitations concerning the outcomes of this study. First, the recruitment and response can be seen as a limitation. The catch-up campaign was implemented during the time that this study was conducted; the impact of this limitation on the study is that two dependent variables, uptake and intention, had to be constructed. The consequence of creating these two dependent variables that divide the sample is that the number of respondents for each dependent variable is lower than the number of respondents in the total sample. The uptake of the MenACWY-vaccine in the sample is 78.7%, lower than the uptake of the MenACWY-vaccine among adolescents in 2018. The implication of this limitation on the interpretation of the results of this study is that the results have to be interpreted with caution, seen the small number of respondents that are present in some categories of the independent variables. A recommendation for future research, in light of this limitation, is to conduct a cross-sectional study on the intention to receive the MenACWY-vaccine before a catch-up campaign is implemented or to conduct a cross-sectional study on the uptake of the MenACWY-vaccine after a catch-up campaign is finalized. Ideally, a longitudinal study design could be conducted to measure the intention to receive the MenACWY-vaccine and, after the catch-up campaign is finalized, the uptake of the MenACWY-vaccine can be compared to the intention, and the effect of the (government) campaign(s) on the concepts of the Health Belief Model (or another theoretical model) can be determined. The relatively small number of respondents can be seen as a limitation of this study. Despite the efforts of the researcher to generate more respondents, 301 adolescents have participated in this study. The researcher has found, using exclusion-criteria, that 242 responses were usable for analyses. As mentioned in the previous limitation, dividing the 242 adolescents in two dependent outcomes has resulted in 127 adolescents for the dependent variable uptake, and 139 adolescents for the dependent variable uptake. An implication of this relatively low number of respondents is that multivariate analysis could not be performed. The implication of the results being based on bivariate analyses is that the association between the dependent and independent variables is not taking other independent variables into account. For example, religion of the adolescents and the religion of the adolescents' parents are significantly associated with the intention to receive the MenACWY-vaccine. Possibly, multivariate analysis would show that either the religion of the adolescents or the religion of the adolescents' parents is significantly associated with the intention. An implication of this limitation for the interpretation of the results is that the results have to be interpreted with caution. A recommendation for future research is to include more respondents in the sample to make it possible to perform multivariate analyses. The educational level of the sample can be seen as a limitation of this study. Only adolescents with an educational level of 'VMBO-T', 'HAVO', and 'VWO' have participated in this study. The implications for the interpretation of the results of this study is that the results are not generalizable to adolescents with a lower educational level than 'VMBO-T'. The results of the study have to be interpreted with caution; the results only represent the adolescents that follow the 'VMBO-T', 'HAVO', and 'VWO' educational levels. A recommendation for future research is to include all educational levels in the sample to make results generalizable for adolescents of all education levels and to target the provision of information to different educational levels.

Second, the location of the schools that have participated in this study can be seen as a limitation of this study. The schools in which respondents were recruited are located in the middle and

eastern part of the Netherlands. Areas which are associated with a higher objection to vaccines in general were not included in this study, for example the bible-belt, and the region of GGD Amsterdam, and GGZ Zeeland. The implications for the interpretation of the results of this study is that the results are not generalizable to other parts of the Netherlands. The implications for the usability of this study are limited, this study has different independent variables that are, besides educational level and religion, significantly associated with the uptake of and intention to receive the MenACWY-vaccine. A recommendation for future research is to conduct the study in more municipalities in the Netherlands that are spread over the Netherlands.

Third, the quality of the data can be seen as a limitation of this study. The adolescents were asked to report their background characteristics in the questionnaire. This study assumes that the answers that respondents have given to those questions represent the truth. However, the reliability of the data could be improved if these data was retrieved from Praeventis and the 'Bevolkingsregister' (population register). The implications for this study are that the results have to be interpreted with caution. The researcher has chosen to not use the uptake from Praeventis and data from the 'Bevolkingsregister' seen the ethical procedure (consent from adolescents and parents) that is needed before the data could be retrieved and it was more convenient to ask questions in the questionnaire seen the limited time in which this study has to be conducted. A recommendation for future research is to conduct the study using the uptake from Praeventis and the 'Bevolkingsregister'.

Apart from the limitations of this study, there are also three important strengths concerning the outcomes of this study. First, the study design can be seen as a strength of this study. Seen the limited time in which this study had to be conducted, a cross-sectional study design was chosen to determine the factors that influence the uptake of and intention to receive the MenACWY-vaccine. Ideally, as read before in the limitations of this study, a longitudinal study-design would be most suitable to determine the factors that influence the uptake of and intention to receive the MenACWY-vaccine.

Second, the theoretical framework that was used in this study, namely the Health Belief Model, can be seen as a strength of this study. The Health Belief Model was used in this study instead of a model specifically addressing vaccine hesitancy as this study is of an explorative nature and the Health Belief Model is more concise in the factors that could influence health related behavior. The findings from this study can be used to determine the scope of future research to the factors that influence the uptake of and intention to receive the MenACWY-vaccine. A recommendation for future research is to use a theoretical framework focusing on vaccine hesitancy as this will show possible other factors to be influential on the uptake of and intention to receive the MenACWY-vaccine.

Third, despite only two schools participating in this study, the background characteristics represent the total sample of adolescents in the Netherlands. The religion of the adolescents that have participated in this study represent the total sample of adolescents in the Netherlands and the division of religious and non-religious parents of the adolescents represent the division of religious and non-religious individuals (CBS, 2019-b).

5.4: Future implementation of vaccinating adolescents with the MenACWY-vaccine

The future implementation of offering the MenACWY-vaccine to adolescents should focus on different aspects based on the findings from this study. The future implementation should be considered with the limitations and strengths of this study in mind.

In order to increase the uptake of and intention to receive the MenACWY-vaccine future implementation of offering the MenACWY-vaccine to adolescents should focus on three aspects. First, the information that is provided to adolescents should increase the knowledge of adolescents about meningococcal disease and the vaccine. The information that is offered to adolescents should focus on the knowledge of adolescents to increase the perceived susceptibility, and perceived severity of meningococcal disease, and to increase the perceived benefits of the MenACWY-vaccine. In order to focus the provision of information of adolescents on the aforementioned factors, adolescents would

like to receive information about the susceptibility, the risk on side-effects from the vaccine, information about the effectiveness of the vaccine, information about the content of the vaccine, information about the severity of the disease, and information about the experience of other adolescents with the vaccines. In order to reach the adolescents with the information, the government should consider to do this through a folder/letter, through parents/guardians of adolescents, a doctor/nurse, and through information that is provided to adolescents at school.

Second, adolescents have reported that their parents' thoughts on them getting the MenACWY-vaccine influences the uptake of and intention to receive the MenACWY-vaccine, and that they would like to receive information about vaccines through their parents. Future implementation should focus on the provision of information to the parents of adolescents. However, research has to be done to determine the factors that influence the intention of parents to recommend the MenACWY-vaccine to their child/adolescent.

Third, the provision of information should be different for adolescents that follow different educational levels. This study has found that the uptake of the MenACWY-vaccine is highest among adolescents who follow 'VWO'. Research has to be done to determine the factors that influence the uptake of and intention to receive the MenACWY-vaccine by adolescents in different educational levels. The outcome of this research could be used to target the provision of information tailored to the different educational levels in order to increase the knowledge of adolescents about meningococcal disease and the MenACWY-vaccine.

References

Alberts, C.J., Schim van der Loeff, M.F., Hazeveld, Y., Melker, H.E. de, Wal, M.F. van der, Nielen, A., Fakiri, F. El, Prins, M. & Paulussen, T.G.W.M. (2017). A longitudinal study on determinants of HPV vaccination uptake in parents/guardians from different ethnic backgrounds in Amsterdam, the Netherlands. *BMC Public Health. (17(220)).* Retrieved from https://doi.org/10.1186/s12889-017-4091-4.

Baker, E.H. (2014). Socioeconomic Status, Definition. *The Wiling Blackwell Encyclopedia of Health, Illness, Behavior, and Society.* Retrieved from https://doi.org/10.1002/9781118410868.wbehibs395.

Bijlsma, M.W., Bekker, V., Brouwer, M.C., Spanjaard, L., Beek, D. van de & Ende, A. van der. (2014). Epidemiology of invasive meningococcal disease in the Netherlands, 1960-2012: an analysis of national surveillance data. *The Lancet. Infectious Diseases (14(9)), 805-812.* http://dx.doi.org/10.1016/ S1473-3099(14)70806-0.

Blagden, S., Seddon, D., Hungerford, D. & Stanistreet, D. (2017). Uptake of a new meningitis vaccination programme amongst first-year undergraduate students in the United Kingdon: A cross-sectional study. *PLoS ONE. (12(8*). https://doi.org/10.1371/journal.pone.0181817.

Cambridge Dictionary. (2019). *Age.* Retrieved on 28 March 2019 from https://dictionary.cambridge.org/dictionary/english/age.

Carpenter, C.J. (2010). A Meta-Analysis of the Effectiveness of Health Belief Model Variables in Predicting Behavior. *Health Communication. (25(8)).*https://doi.org/10.1080/10410236.2010.521906.

CDC. (2012). *Lesson 1: Introduction to Epidemiology. Section 10: Chain of* Infection. Retrieved on 12 February 2019 from https://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson1/section10.html.

Centraal Bureau voor de Statistiek BS. (2016). *Wie zijn de derde generatie?.* Retrieved on 8 May 2019 from https://www.cbs.nl/nl-nl/nieuws/2016/47/wie-zijn-de-derde-generatie-.

Centraal Bureau voor de Statistiek. (2019-a). *Standaard Onderwijsindeling 2016.* Retrieved on 24 April 2019 from https://www.cbs.nl/-/media/_pdf/2019/12/pubsoi2016_ed1819.pdf.

Centraal Bureau voor de Statistiek. (2019-b). *Religieuze betrokkenheid; persoonskenmerken.* Retrieved on 4 June 2019 from https://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=82904NED&D1=0-7&D2=0,3-4&D3=a&HDR=T&STB=G1,G2&VW=T.

Champion, V.L. & Skinner, C.S. (2008). The Health Belief Model. *Health Behavior and Health Education. Theory, Research and Practice. 4th edition. 45-62.* Retrieved on 11 March 2019 from http://fhc.sums.ac.ir/files/salamat/health_education.pdf.

Cloninger, S. (2009). *The Cambridge Handbook of Personality Psychology.* Cambridge: Cambridge University Press. Retrieved from https://sangu.ge/images/PersonalityPsychology.pdf.

Donkers, H.W., Hautvast, J.L.A., Akkermans, R.P., Swaan, C.M., Ruijs, W.L.M. & Hulscher, M.E.J.L. (2015). Determinants of students' willingness to accept a measles–mumps–rubella booster vaccination during a mumps outbreak: a cross-sectional study. *BMC Public Health. (15).* Retrieved from https://doi.org/10.1186/s12889-015-1899-7.

Dubé, E., Laberge, C., Guay, M., Bramadat, P., Roy, R. & Bettinger, J. (2013). Vaccine hesitancy: An overview. *Human vaccines and Immunotherapeutics. (9(8)). 1763-1773.* Retrieved from https://doi.org/10.4161/hv.24657

ECDC. (2019). *Disease data from ECDC Surveillance Atlas for meningococcal disease.* Retrieved on 27 February 2019 from https://ecdc.europa.eu/en/meningococcal-disease/surveillance-and-disease-data/atlas.

Field, A. (2013). *Discovering Statistics using IBM SPSS Statistics.* London: *SAGE Publications Ltd.*

Gezondheidsraad. (2018). *Vaccinatie tegen Meningokokken.* Retrieved on 20 February 2019 from https://www.gezondheidsraad.nl/binaries/gezondheidsraad/documenten/adviezen/2018/12/19/vaccinatie-tegen-meningokokken/Advies+Vaccinatie+tegen+meningokokken.pdf.

Grandahl, M., Rosenblad, A., Stenhammar, C., Tydén, T., Westerling, R., Larsson, M., Oscarsson, M., Andrae, B., Dalianis, T. & Nevéus, T. (2016). School-based intervention for the prevention of HPV among adolescents: a cluster randomised controlled study. *BMJ Open. (6(1)).* Retrieved from https://doi.org/10.1136/bmjopen-2015-009875.

Griffiths, P. (2002). Evidence informing practice: introducing the mini-review. *British journal of community nursing*, 38-40. Retrieved on 22 February 2019 from https://doi.org/10.12968/bjcn.2002.7.1.9435.

Janz, N.K. & Becker, M.H. (1984). The Health Belief Model: A Decade Later. *Health Education & Behavior. (11(1)). 1-47.* https://doi.org/10.1177%2F109019818401100101.

Karafillakis, E. & Larson, H.J. (2017). The benefit of the doubt or doubts over benefits? A systematic literature review of perceived risks of vaccines in European populations. *Vaccine. (35(37)). 4840-4850.* Retrieved from https://doi.org/10.1016/j.vaccine.2017.07.061.

Knol, M.J., Hahné, S.J.M., Lucidarme, J., Campbell, H., Melker, H.E. de, Gray, S.J., Borrow, R., Ladhani, S.N., Ramsay, M.E. & Ende, A. van der. (2017). Temporal associations between national outbreaks of meningococcal serogroup W and C disease in the Netherlands and England: an observational cohort study. *The Lancet. Public Health. (2(10)), 473-482.* https://doi.org/10.1016/S2468-2667(17)30157-3.

Knol, M.J., Ruijs, W.L.M., Antonise – Kamp, L. Melker, H.E. de & Ende, A. van der. (2018). Implementation of MenACWY vaccination because of ongoing increase in serogroup W invasive meningococcal disease, the Netherlands, 2018. *Euro surveillance (23(16)), 18-00185.* https://doi.org/10.2807/1560-7917.ES.2018.23.16.18-00158.

Larson, H.J., Jarret, C., Eckersberger, E., Smith, D.M.D. & Paterson, P. (2014). Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: A systematic review of published literature, 2007-2012. *Vaccine. (32). 2150-2159*. http://dx.doi.org/10.1016/j.vaccine.2014.01.081.

Larson, H.J., Jarret, C., Schulz, W.S., Chaudhuri, M., Zhou, Y., Dube, E., Schuster, M., MacDonald, N.E., Wilson, R. & SAGE Working Group on Vaccine Hesitancy. (2015). Measuring vaccine hesitancy: the development of a survey tool. *Vaccine. (33). 4165-4175.* http://dx.doi.org/10.1016/j.vaccine.2015.04.037.

Levin, K.A. (2006). Study Design III: Cross-sectional studies. *Evidence based Dentistry. 7. 24-25.* https://doi.org/10.1038/sj.ebd.6400375.

Lier, A. van, Kassteele, J. van de, Hoogh, P. de, Drijfhout, I. & Melker, H. de. (2013). Vaccine uptake determinants in the Netherlands. *European Journal of Public Health. (24(2)). 304-309.* https://doi.org/10.1093/eurpub/ckt042.

Mann, C.J. (2003). Observational research methods. Research design II: cohort, cross sectional, and case-control studies. *Emergency Medicine Journal. (20(1)). http://dx.doi.org/10.1136/emj.20.1.54.*

Moher, D., Liberati, A., Tetzlaff, J., Altman, D., PRISMA Group. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *Journal of Clinical Epidemiology. (62(10)). 1006-1012.* https://doi.org/10.1016/j.jclinepi.2009.06.005

National Heart, Lung, and Blood Institute. (N.D.). *Study Quality Assessment Tools.* Retrieved on 29 May 2019 from https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools.

Nuffic. (2018-a). *Onderwijssysteem Verenigd Koninkrijk. Beschreven en vergeleken met het Nederlandse systeem.* Retrieved on 26 June 2019 from https://www.nuffic.nl/documents/86/onderwijssysteem-verenigd-koninkrijk.pdf.

Nuffic. (2018-b). *Onderwijssysteem Verenigde Staten. Beschreven en vergeleken met het Nederlandse systeem.* Retrieved on 26 June 2019 from https://www.nuffic.nl/documents/486/onderwijssysteem-verenigde-staten.pdf.

Pot, M., Keulen, H.M. van, Ruiter, R.A.C., Eekhout, I., Mollema, L. & T.W.G.M. Paulussen. (2017). Motivational and contextual determinants of HPV-vaccination uptake: A longitudinal study among mothers of girls invited for the HPV-vaccination. *Preventive Medicine. (100). 41-49.* Retrieved from https://doi.org/10.1016/j.ypmed.2017.04.005.

Public Health England. (2018). Vaccine coverage for the GP based catch-up meningococcal ACWY (MenACWY) immunisation programme in England to the end of March 2018. *Health Protection Report. (12(8)).* Retrieved on 20 February 2019 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/711444/hpr1818_menACWY-vc.pdf.

Public Health England. (2019). Vaccine coverage estimates for the school based meningococcal ACWY (MenACWY) adolescent vaccination programme in England, to 31 August 2018*. Health Protection Report. (13(3)).* Retrieved on 20 February 2019 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/773539/hpr0319_vc-menACWY.pdf.

RIVM. (2017). *Meningococcal disease in the Netherlands. Background information for the Health Council.* Retrieved on 12 February 2019 from https://doi.org/10.21945/RIVM-2017-0031 .

RIVM. (2018-a). *De pijlers van het Rijksvaccinatieprogramma.* Retrieved on 12 February 2019 via https://www.rivm.nl/pijlers-van-rijksvaccinatieprogramma.

RIVM. (2018-b). *The national immunization programme in the Netherlands. Surveillance and development in 2017-2018.* Retrieved on 7 February 2019 from https://doi.org/10.21945/RIVM-2018-0124.

RIVM. (2018-c). *Richtlijn uitvoering RVP 2019.* Retrieved on 18 February 2019 from https://rijksvaccinatieprogramma.nl/documenten/richtlijn-uitvoering-rvp-2019.

RIVM. (2018-d). *Vaccinatiegraad en jaarverslag. Rijksvaccinatieprogramma Nederland 2017*. Retrieved on 18 February 2019 from https://www.rivm.nl/bibliotheek/rapporten/2018-0008.pdf.

RIVM. (2018-e). *PIOM-onderzoek: Passende informatie over meningokokken.* Retrieved on 21 February 2019 from https://www.rivm.nl/meningokokken/piom-onderzoek-passende-informatie-over-meningokokken.

RIVM. (2018-f). *HPV-vaccinatie bij 13 jaar.* Retrieved on 4 April 2019 from https://rijksvaccinatieprogramma.nl/vaccinaties/hpv.

RIVM. (2019-a). *Meningokokken-meningitis en -sepsis.* Retrieved on 14 February 2019 from https://lci.rivm.nl/richtlijnen/meningokokken-meningitis-en-sepsis#epidemiologie.

RIVM. (2019-b). *Toename meningokokkenziekte serogroep W sinds oktober 2015.* Retrieved on 18 February 2019 from https://www.rivm.nl/meningokokken/toename-meningokokkenziekte-serogroep-w-sinds-oktober-2015.

RIVM. (2019-d). *Meningokokken.* Retrieved on 2 May 2019 from https://www.rivm.nl/meningokokken.

RIVM. (2019-e). *Welke infectieziekten zijn meldingsplichtig?.* Retrieved on 17 June 2019 from https://www.rivm.nl/meldingsplicht-infectieziekten/welke-infectieziekten-zijn-meldingsplichtig.

RIVM. (N.D.-a). *Dutch National Immunisation Programme.* Retrieved on 12 February 2019 from https://rijksvaccinatieprogramma.nl/english.

RIVM. (N.D.-b). *Vaccination schedule English.* Retrieved on 18 February 2019 from https://rijksvaccinatieprogramma.nl/media/4301.

RIVM. (N.D.-c). *Kinderen geboren vanaf 2001 t/m 2005.* Retrieved on 1 March 2019 from https://rijksvaccinatieprogramma.nl/professionals/menacwy-vaccinatie/kinderen-geboren-vanaf-2001-tm-2005.

Rosenstock, I.M. (1966). Why people use health services. *Milbank Memorial Fund Quarterly. (44). 94-127.* Retrieved on 27 March 2019 from https://www-ncbi-nlm-nih-gov.ezproxy2.utwente.nl/pubmed/5967464?dopt=Abstract.

Rosenstock, I.M. (1974). The Health Belief Model and Preventive Health Behavior. *Health Education Monographs. (2(4)). 354-386.* Retrieved on 11 March 2019 from https://journals.sagepub.com/doi/pdf/10.1177/109019817400200405.

Spaan, D.H., Ruijs, W.L.M., Hautvast, J.L.A. & Tostmann, A. (2017). Increase in the vaccination coverage between subsequent generations of orthodox Protestants in the Netherlands. *European Journal of Public Health. (27(3)). 524-530*. https://doi.org/10.1093/eurpub/ckw248.

Stronks, K., Kulu-Glasgow, I. & Agyemang, C. (2009). The utility of 'country of birth' for the classification of ethnic groups in health research: the Dutch experience. *Ethnicity & Health. (14(3)). 255-269.* Retrieved from https://doi.org/10.1080/13557850802509206.

University of Twente. (2015). *UT Research Data Policy.* Retrieved on 20 May 2019 from https://www.utwente.nl/en/bms/research/forms-and-downloads/research-data-policy-ut.pdf.

WHO. (2013). *Global Vaccine Action Plan. 2011-2020.* Retrieved on 19 February 2019 from https://www.who.int/iris/bitstream/10665/78141/1/9789241504980_eng.pdf?ua=1.

WHO. (2018). *Meningococcal meningitis.* Retrieved on 12 February 2019 from https://www.who.int/news-room/fact-sheets/detail/meningococcal-meningitis.

WHO. (2019). *Infectious diseases.* Retrieved on 12 February 2019 from https://www.who.int/topics/infectious_diseases/en/.

WHO. (N.D.). *Gender: Definitions.* Retrieved on 28 March 2019 from http://www.euro.who.int/en/health-topics/health-determinants/gender/gender-definitions.

Zee – Berg, A.I. van der – van den, Boere – Boonekamp, M.M. & IJzerman, M.J. (2017). Screening for postpartum depression in well-baby are settings: a systematic review. *Maternal and Child Health Journal. (21(1)). 9-20.* https://doi.org/10.1007/s10995-016-2088-8.

Appendix

I: Vaccination Coverage NIP Netherlands

Report year	Newborns*							
	cohort	DTaP-IPV	Hib	HBVa	PCV **	MMR	MenC	full ***
2006	2003	94.3	95.4	15.2	-	95.4	94.8	
2007	2004	94.0	95.0	17.1	-	95.9	95.6	
2008	2005	94.5	95.1	17.9	-	96.0	95.9	
2009	2006	95.2	95.9	18.6	94.4	96.2	96.0	
2010	2007	95.0	95.6	19.3	94.4	96.2	96.1	
2011	2008	95.4	96.0	19.4	94.8	95.9	95.9	
2012	2009	95.4	96.0	19.5	94.8	95.9	95.9	
2013	2010	95.5	96.1	19.7	95.1	96.1	96.0	
2014	2011	95.4	95.9	51.4	95.0	96.0	95.8	
2015	2012	94.8	95.4	94.5	94.4	95.5	95.3	
2016	2013	94.2	94.9	93.8	93.8	94.8	94.6	
2017	2014	93.5	94.2	93.1	93.6	93.8	93.5	91.2
2018	**2015**	**92.6**	**93.4**	**92.2**	**92.8**	**92.9**	**92.6**	**90.2**

Report year	Toddlers*				Schoolchildren*			Adolescent girls*	
	cohort	DTaP-IPV[b]	DTaP-IPV[c]	DTaP-IPV[d]	cohort	DT-IPV	MMR ****	cohort	HPV
2006	2000	92.5	1.4	93.9	1995	93.0	92.9		
2007	2001	92.1	1.6	93.7	1996	92.5	92.5		
2008	2002	91.5	1.6	93.1	1997	92.6	92.5		
2009	2003	91.9	2.0	93.9	1998	93.5	93.0		
2010	2004	91.7	2.6	94.3	1999	93.4	93.1		
2011	2005	92.0	2.6	94.7	2000	92.2	92.1		
2012	2006	92.3	2.1	94.4	2001	93.0	92.6	1997	56.0
2013	2007	92.3	2.4	94.7	2002	93.1	92.9	1998	58.1
2014	2008	92.0	2.4	94.4	2003	92.7	92.4	1999	58.9
2015	2009	91.9	2.2	94.1	2004	92.7	92.7	2000	61.0
2016	2010	91.5	2.1	93.7	2005	92.0	92.0	2001	61.0
2017	2011	91.1	2.1	93.2	2006	90.8	90.9	2002	53.4
2018	**2012**	**90.4**	**2.3**	**92.7**	**2007**	**90.0**	**90.1**	**2003**	**45.5**

* Vaccination coverage is assessed at the ages of two years (newborns), five years (toddlers), 10 years (schoolchildren) and 14 years (adolescent girls).
** Only for newborns born on or after 1 April 2006.
*** Key figure full participation newborns: received all NIP vaccinations at two years of age.
**** Two MMR vaccinations (in the past 'at least one MMR vaccination' was reported).
a Percentage of the total cohort. In 2011 universal hepatitis B vaccination was introduced; only risk groups were vaccinated previously.
b Revaccinated toddlers.
c Toddlers that reached basic immunity at age 2–5 years and were therefore not eligible for revaccination at toddler age.
d Sufficiently protected toddlers (sum of b and c).

Table 1: Vaccination coverage per vaccine for age cohorts of newborns, toddlers, schoolchildren and adolescent girls in 2006-2018. Reprinted from RIVM, 2018-b, retrieved from *https://www.rivm.nl/bibliotheek/rapporten/2018-0124.pdf*.

*Figure 1 and table 1 show a different vaccine for meningococcal disease. This vaccine was changed in 2018, the change of vaccine is explained in detail in paragraph 1.3.2.

II: Incidence meningococcal disease NL

Table: Incidence rate and number of cases reported for meningococcal disease sorted by serogroup B, C, W, and Y in the Netherlands. Data retrieved from ECDC (2019) and RIVM (2019-b).
… / … = Incidence rate (= number of cases per 100,000) / absolute number of cases in the Netherlands

	B	C	W	Y	Total
1999	2.98 / 469	0.51 / 81	0.07 / 11	0.03 / 4	3.6 / 567
2000	2.63 / 417	0.67 / 106	0.09 / 14	0.01 / 2	3.4 / 540
2001	2.70 / 432	1.79 / 286	0.09 / 14	0.03 / 4	4.62 / 738
2002	2.33 / 375	1.34 / 216	0.04 / 7	0.04 / 7	3.77 / 607
2003	1.78 / 289	0.26 / 42	0.04 / 6	0.03 / 5	2.12 / 344
2004	1.46 / 237	0.10 / 17	0.02 / 4	0.04 / 7	1.64 / 267
2005	1.32 / 216	0.02 / 4	0.01 / 2	0.02 / 4	1.51 / 246
2006	0.96 / 157	0.02 / 4	0.02 / 3	0.02 / 4	1.05 / 171
2007	0.97 / 159	0.06 / 10	0.03 / 5	0.06 / 10	1.14 / 186
2008	0.60 / 98	0.07 / 11	0.02 / 3	0.03 / 5	0.99 / 162
2009	0.70 / 116	0.04 / 6	0.02 / 4	0.02 / 4	0.91 / 150
2010	0.63 / 104	0.06 / 10	0.03 / 5	0.06 / 10	0.86 / 143
2011	0.47 / 79	0.02 / 4	0.01 / 1	0.08 / 13	0.64 / 106
2012	0.45 / 76	0.02 / 4	0.01 / 2	0.09 / 15	0.66 / 110
2013	0.47 / 79	0.03 / 5	0.04 / 6	0.03 / 10	0.64 / 108
2014	0.33 / 56	0.02 / 3	0.01 / 1	0.07 / 12	0.49 / 83
2015	0.38 / 65	0.05 / 8	0.05 / 9	0.04 / 7	0.53 / 90
2016	0.45 / 77	0.04 / 6	0.30 / 51	0.10 / 17	0.90 / 152
2017	0.47 / 81	0.05 / 9	0.47 / 80	0.16 / 27	1.16 / 198
2018*			0.60 / 103		

III: Incidence meningococcal disease EU

Table: Incidence rate and number of cases reported for meningococcal disease sorted by serogroup B, C, W, and Y in the European Union. Data retrieved from ECDC (2019).
Incidence (number of new cases per 100,000)

	B	C	W	Y	Total
1999	0.96	0.48	0.02	0.02	1.63
2000	0.97	0.43	0.05	0.02	1.6
2001	0.92	0.33	0.05	0.02	1.55
2002	0.87	0.32	0.04	0.02	1.42
2003	0.82	0.20	0.03	0.02	1.27
2004	0.75	0.17	0.03	0.03	1.10
2005	0.65	0.15	0.02	0.02	0.97
2006	0.66	0.13	0.02	0.02	0.93
2007	0.72	0.14	0.02	0.03	1.04
2008	0.67	0.14	0.02	0.03	0.95
2009	0.63	0.12	0.02	0.04	0.89
2010	0.51	0.10	0.02	0.04	0.74
2011	0.51	0.10	0.02	0.06	0.76
2012	0.43	0.11	0.03	0.05	0.69
2013	0.42	0.09	0.03	0.06	0.68
2014	0.31	0.08	0.04	0.08	0.54
2015	0.33	0.08	0.06	0.06	0.61
2016	0.32	0.09	0.09	0.07	0.63
2017	0.30	0.09	0.10	0.07	0.62
2018*					

IV: Incidence meningococcal disease UK

Table: Incidence rate and number of cases reported for meningococcal disease sorted by serogroup B, C, W, and Y in the United Kingdom. Data retrieved from ECDC (2019).

… / … = Incidence (number of cases per 100,000) / absolute number of cases in the Netherlands

	B	C	W	Y	Total
1999	2.31 / 1353	1.73 / 1014	0.08 / 48	0.03 / 19	4.72 / 2765
2000	2.76 / 1624	1.32 / 774	0.18 / 108	0.04 / 24	4.75 / 2794
2001	2.86 / 1690	0.58 / 341	0.23 / 137	0.05 / 30	4.06 / 2393
2002	2.39 / 1417	0.30 / 179	0.14 / 82	0.05 / 28	3.12 / 1848
2003	2.39 / 1420	0.18 / 105	0.07 / 42	0.03 / 19	2.84 / 1692
2004	1.98 / 1182	0.11 / 64	0.06 / 35	0.05 / 31	2.33 / 1394
2005	1.01 / 609	0.03 / 18	0.05 / 29	0.06 / 38	1.17 / 702
2006	1.81 / 1100	0.05 / 28	0.04 / 25	0.05 / 32	2.01 / 1220
2007	2.03 / 1240	0.07 / 43	0.06 / 37	0.06 / 37	2.49 / 1522
2008	1.95 / 1201	0.04 / 24	0.03 / 19	0.08 / 49	2.20 / 1355
2009	1.70 / 1055	0.01 / 9	0.04 / 24	0.11 / 67	1.92 / 1190
2010	1.37 / 857	0.03 / 20	0.04 / 25	0.11 / 70	1.61 / 1008
2011	1.33 / 837	0.05 / 29	0.05 / 34	0.15 / 96	1.64 / 1036
2012	1.06 / 674	0.05 / 32	0.08 / 50	0.14 / 89	1.36 / 862
2013	0.96 / 616	0.05 / 33	0.13 / 82	0.14 / 91	1.13 / 852
2014	0.75 / 483	0.06 / 38	0.19 / 122	0.14 / 87	1.17 / 750
2015	0.81 / 527	0.06 / 36	0.33 / 216	0.18 / 120	1.44 / 935
2016	0.69 / 452	0.07 / 46	0.36 / 236	0.18 / 116	1.31 / 859
2017	0.62 / 410	0.08 / 55	0.33 / 217	0.12 / 82	1.17 / 772
2018*					

V: Results mini-review

Search Matrix Mini-review:

Database	Search term	# of records
Scopus (1)	Netherlands AND vaccination AND determinants AND uptake AND (LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018) OR LIMIT-TO (PUBYEAR,2017) OR LIMIT-TO (PUBYEAR,2016) OR LIMIT-TO (PUBYEAR,2015) OR LIMIT-TO (PUBYEAR,2014)) AND (LIMIT-TO (LANGUAGE,"English")) AND (LIMIT-TO (AFFILCOUNTRY,"Netherlands"))	178
Scopus (2)	"Health Belief Model" OR hbm AND TITLE-ABS-KEY-AUTH (adolescents OR teen* OR parents OR students AND factors OR determinants OR acceptance AND vaccination OR vaccine OR "vaccine uptake" OR "vaccination coverage") AND (LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014)) AND (LIMIT-TO (LANGUAGE , "English"))	258
Web of Science (1)	TOPIC: (Netherlands) AND TOPIC: (Vaccination) AND TOPIC: (Determinants) AND TOPIC: (Uptake) Timespan: Last 5 years. Databases: WOS, KJD, MEDLINE, RSCI, SCIELO. Search language=Auto	11
Web of Science (2)	TOPIC: ("Health Belief Model" OR HBM) AND TOPIC: (adolescents OR teen*) AND TOPIC: (vaccination OR vaccine OR "vaccine uptake" OR "vaccination coverage") AND TOPIC: (factors OR determinants OR acceptance) Timespan: Last 5 years. Databases: WOS, KJD, MEDLINE, RSCI, SCIELO. Search language=Auto	41
Cochrane (1)	Netherlands in Title Abstract Keyword AND Vaccination in Title Abstract Keyword AND Determinants in Title Abstract Keyword AND Uptake in Title Abstract Keyword - (Word variations have been searched) Year: Custom Range: 2014-2019	2

Cochrane (2)	"Health Belief Model" OR HBM in Title Abstract Keyword AND adolescents OR teen* AND factors OR determinants OR acceptance in Title Abstract Keyword AND vaccination OR vaccine OR "vaccine uptake" OR "vaccination coverage" in Title Abstract Keyword - (Word variations have been searched) Year: Custom Range: 2014-2019	7
Pubmed (1)	((((Netherlands[Abstract] OR Dutch[Abstract])) AND Vaccination[Title]) AND (Uptake OR Acceptance OR Intention)) AND (Determinants OR factors)	24
Pubmed (2)	((((("Health belief model"[Text Word] OR HBM[Text Word])) AND (adolescents[Abstract] OR teen[Text Word] OR student[Text Word])) AND (factors[Abstract] OR determinants[Abstract] OR acceptance[Abstract] OR intention[Title])) AND (vaccination[Title] OR vaccine[Title] OR "vaccination uptake"[Title] OR "vaccination coverage"[Title])	29

Checklists Quality:
N.A. = not applicable

A longitudinal study on determinants of HPV vaccination uptake in parents/guardians from different ethnic backgrounds in Amsterdam, the Netherlands. Alberts et al. (2017).

Criteria	Yes	No	Other
1. Was the research question or objective in this paper clearly stated?	X		
2. Was the study population clearly specified and defined?	X		
3. Was the participation rate of eligible persons at least 50%?		X	
4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	X		
5. Was a sample size justification, power description, or variance and effect estimates provided?		X	
6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?			N.A.
7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	X		
8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	X		
9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	X		
10. Was the exposure(s) assessed more than once over time?		X	
11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	X		
12. Were the outcome assessors blinded to the exposure status of participants?	X		
13. Was loss to follow-up after baseline 20% or less?	X		
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	X		

Uptake of a new meningitis vaccination programme amongst first-year undergraduate students in the United Kingdom: A cross-sectional study. Blagden, Seddon, Hungerford & Stanistreet. (2017).

Criteria	Yes	No	Other
1. Was the research question or objective in this paper clearly stated?	X		
2. Was the study population clearly specified and defined?	X		
3. Was the participation rate of eligible persons at least 50%?		X	
4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	X		
5. Was a sample size justification, power description, or variance and effect estimates provided?		X	
6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?			N.A.
7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	X		
8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	X		
9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	X		
10. Was the exposure(s) assessed more than once over time?	X		

11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	X		
12. Were the outcome assessors blinded to the exposure status of participants?	X		
13. Was loss to follow-up after baseline 20% or less?	X		
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	X		

The benefit of the doubt or doubts over benefits? A systematic literature review of perceived risks of vaccines in European populations. Karafillakas & Larson (2017).

Section/topic	*#*	*Checklist item*	*Reported on page #*
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	4840
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	4840
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4841
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4841
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	4841
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4841
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4841
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4841
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	4841
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	4841
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4841
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	4841
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N.A.

Section/topic	*#*	*Checklist item*	*Reported on page #*
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	4841/4842
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	N.A.
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	4841
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	4842
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	4843
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12).	N.A.
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	4843
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N.A.
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N.A.
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	4845
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers).	4846
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	4847
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	4846
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	4847

Motivational and contextual determinants of HPV-vaccination uptake: A longitudinal study among mothers of girls invited for the HPV-vaccination. Pot et al. (2017).

Criteria	Yes	No	Other
1. Was the research question or objective in this paper clearly stated?	X		
2. Was the study population clearly specified and defined?	X		

3. Was the participation rate of eligible persons at least 50%?			N.A.
4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	X		
5. Was a sample size justification, power description, or variance and effect estimates provided?		X	
6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?			N.A.
7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	X		
8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	X		
9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	X		
10. Was the exposure(s) assessed more than once over time?		X	
11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	X		
12. Were the outcome assessors blinded to the exposure status of participants?	X		
13. Was loss to follow-up after baseline 20% or less?	X		
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	X		

Determinants of students' willingness to accept a measles–mumps–rubella booster vaccination during a mumps outbreak: a cross-sectional study.
Donkers et al. (2015).

Criteria	Yes	No	Other
1. Was the research question or objective in this paper clearly stated?	X		
2. Was the study population clearly specified and defined?	X		
3. Was the participation rate of eligible persons at least 50%?		X	
4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	X		
5. Was a sample size justification, power description, or variance and effect estimates provided?		X	
6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?			N.A.
7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	X		
8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	X		
9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	X		
10. Was the exposure(s) assessed more than once over time?		X	
11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	X		
12. Were the outcome assessors blinded to the exposure status of participants?	X		
13. Was loss to follow-up after baseline 20% or less?	X		
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	X		

Vaccine uptake determinants in The Netherlands.
van Lier et al. (2014).

Criteria	Yes	No	Other

1. Was the research question or objective in this paper clearly stated?	X		
2. Was the study population clearly specified and defined?	X		
3. Was the participation rate of eligible persons at least 50%?			N.A.
4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	X		
5. Was a sample size justification, power description, or variance and effect estimates provided?		X	
6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?			N.A.
7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?			N.A.
8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	X		
9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	X		
10. Was the exposure(s) assessed more than once over time?		X	
11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	X		
12. Were the outcome assessors blinded to the exposure status of participants?	X		
13. Was loss to follow-up after baseline 20% or less?			N.A.
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	X		

Extensive overview results mini-review

Title + Reference	Study design	Setting	Sample description, participation	Outcome measures	Main results
A longitudinal study on determinants of HPV vaccination uptake in parents/guardians from different ethnic backgrounds in Amsterdam, the Netherlands. **Alberts et al. (2017).**	Longitudinal study. Questionnaire about social-psychological determinants of the decision making process regarding the HPV-vaccination of their daughter and socio-demographic characteristics. The questionnaire is based on the reasoned action approach, social cognitive theory and the health belief model.	Netherlands in 2014.	Parents/guardians with a daughter in 2001 living in the district of GGD Youth Care Amsterdam of whom the daughter will receive the first HPV-vaccine in one month. 1,309 parents/guardians have participated of whom 88% was a mother/female guardian. Median age: 45 years old and 28% received higher education. The 1,309 parents/guardians consisted of the following ethnicity: 723 NL (Netherlands), 126 SNA (Surinamese, Netherlands Antilean and Aruban), 237 MENA (Middle Eastern and North African) and 223 other ethnicity.	Impact of determinants and characteristics on both **intention** and **uptake**. Uptake was retrieved from Praeventis, intention was embedded in the questionnaire using a Likert-scale.	- HPV vaccine uptake in 2014: 76% (GGD Amsterdam average: 51%). - HPV vaccination intention was high (1.17 on a Likert scale -2 /+ 2) with differences across ethnic groups. - The **uptake** of the HPV-vaccine is significantly associated with intention, subjective norms, habit strength and childhood vaccination status. - The **intention** to receive the HPV-vaccine is significantly associated with attitude, beliefs, risk perception when not vaccinating, relative effectiveness, subjective norms, descriptive norms, ambivalence towards the decision, information processing, evaluation of the HPV information, past experience with HPV-vaccination with older daughter, past experience with cervical cancer, education and religion.

Uptake of a new meningitis vaccination programme amongst first-year undergraduate students in the United Kingdom: A cross-sectional study. **Blagden, Seddon, Hungerford & Stanistreet. (2017).**	Electronic questionnaire, cross-sectional study. HBM-domains were asked using a 5-point Likert-scale.	University of Liverpool in 2015 and 2016.	First-year undergraduate students. 401 students have participated. Median age: 20 years old. The majority of the respondents was female (313). The sample skews towards more advantaged socio-economic groups (326).	MenACWY uptake and the influence of demographics and the Health Belief Model on the MenACWY uptake.	- MenACWY vaccine uptake among respondents: 68.1%. Significant associations with vaccination: - Age: 18-year old's are more likely to be vaccinated with the MenACWY-vaccine then 19, 20 or 21-25 year old students. - Participants who have taken a gap-year are more likely to be vaccinated. - A participant with a higher perceived knowledge about the risk of meningitis is more likely to be vaccinated. - A participant who perceives the vaccine as effective is more likely to be vaccinated.
The benefit of the doubt or doubts over benefits? A systematic literature review of perceived risks of vaccines in European populations. **Karafillakas & Larson. (2017).**	Systematic Review. Articles published from 2004-2014 in Europe. Articles are included if they studied vaccine risk perceptions or concerns, vaccine confidence and hesitancy, public trust in vaccines and general attitudes and beliefs about vaccines. Descriptive analysis. SAGE-model of determinants of vaccine hesitancy.	Europe	The systematic review has included 145 articles that were published between 2004 and 2014.	Perceived risks of vaccines in the European population.	The common beliefs related to balancing risks of vaccination to non-vaccination were about: - Vaccine safety - Perceived low risk of contracting vaccine preventable diseases (VPDs) - VPDs are not to be found dangerous - Vaccines do not work - Vaccines are not needed - Adults or children are healthy enough not to need vaccination - Not enough evidence or enough adequate testing of vaccines - No recommendation to take the vaccine - Lack of information about vaccines and or VPDs - Concerns were found to be vaccine-, country- and population-specific.
Motivational and contextual determinants of HPV-vaccination uptake: A longitudinal study among mothers of girls invited for the HPV-vaccination. **Pot et al. (2017).**	Longitudinal study. Theory of planned behavior, social cognitive theory and health belief model.	Netherlands, 2015.	Random sample drawn from Praeventis and three online panels. Mothers of Dutch girls invited for the vaccination in 2015. 2 months prior to the vaccination. 6,918 mothers were recruited from Praeventis, 1,144 mothers were recruited from the online panels. Mean age: 44 years. Sample was overrepresented for women	Social-ecological determinants and how this predicts the HPV-vaccination **intention** and **uptake**. Uptake was retrieved from Praeventis.	- Significant differences were found for all socio-demographics (age, country of birth, education, and religion). - Intention is a stable predictor of the **uptake** of the HPV-vaccination. - Age of the mother is a predictor of the **uptake** of the HPV-vaccination. Associations were found between HPV-vaccination **intention** and beliefs about: - The responsibility of the government with regard to the HPV-vaccination.

			born in the Netherlands, women with a high educational level, and for HPV-vaccine uptake in girls.		- The daughters sexual behavior and age in relation to the need to the need for the HPV-vaccination. - The safety and effectiveness of the HPV-vaccination. - The role of the pharmaceutical industry in the HPV-vaccination. - Partner and daughter have appeared influential for the subjective norm.
Determinants of students' willingness to accept a measles–mumps–rubella booster vaccination during a mumps outbreak: a cross-sectional study. **Donkers et al. (2015).**	Cross-sectional study. Printed questionnaire. Hypothetical situation is proposed where students are offered a MMR vaccine to control a mumps outbreak. Theory of Planned Behavior and Social Cognitive Theory.	Netherlands 2009-2012.	Convenience sampling. 687 University Students. Mean age: 21.3 years old. 50.2% male. 87.3% had Dutch citizenship.	Students' willingness and psychosocial and social demographic determinants influencing their willingness to accept an MMR booster vaccination.	- 60.4% of the students are willing to accept the hypothetical MMR booster vaccination. - Year of study was correlated with willingness. - Multivariate logistic regression found a correlation between students' acceptance of the MMR booster vaccination: perceived severity, risk perception, effectiveness of the vaccine in preventing personal and epidemic disease, regretting vaccination if the epidemic turns out not to be severe, perception of social norms, and government advised action. - Students are willing to let themselves be vaccinated if the vaccine is free. - Vaccination venue would also affect the acceptance of the vaccine. - Students are more willing to be vaccinated if they are invited personally.
Vaccine uptake determinants in The Netherlands. **van Lier et al. (2014).**	Hierarchical logistic regression model to quantify association between individual vaccination status and proxy variables for ethnic background, socio-economic status and religious objection to vaccination.	Netherlands, 2009.	Children born in 2005 and registered in Praeventis. Vaccines offered before the age of 14 months. Vaccine DTaP, IPV, HiB, MMR and MenC.	Determinants of vaccine uptake. Based on SES, religious objection and ethnic background. SES was retrieved from postcode and a calculation with average income and % poor households. Religion was found as the number of SGP-voters in the municipality.	- Postcode areas with a lower SES are associated with a lower 'full' vaccine uptake. - Postcode areas with a higher SES are associated with a higher 'full' vaccine uptake. - Municipalities with more religious objection to vaccination are associated with lower 'full' vaccine uptake. - Ethnic background and religion have the greatest relative contribution to the variation within vaccine uptake. The influence of SES was less outspoken,

VI: Criteria Mini-Review

Title	Big effect	Small effect	No effect
A longitudinal study on determinants of HPV vaccination uptake in parents/guardians from different ethnic backgrounds in Amsterdam, the Netherlands. Alberts et al. (2017).	Odds Ratio Uptake: Multivariate analysis has shown a significant association and the difference in odds ratio of the other category in comparison to the reference category is >2. ß Intention: Multivariate analysis has shown a significant association and the difference in ß between 'reference' and the other categories is >0.10. ß Interaction effect: The regression coefficient (ß) for the association between key determinants and intention is significantly associated with the intention and the difference in ß is >0.10.	Odds Ratio Uptake: Multivariate analysis has shown a significant association and the difference in odds ratio of the other category in comparison to the reference category is <2. ß Intention: Multivariate analysis has shown a significant association and the difference in ß between 'reference' and the other categories is <0.10. ß Interaction effect: The regression coefficient (ß) for the association between key determinants and intention is significantly associated with the intention and the difference in ß is <0.10.	Multivariate analysis has not shown any significant associations.
Uptake of a new meningitis vaccination programme amongst first-year undergraduate students in the United Kingdom: A cross-sectional study. Blagden, Seddon, Hungerford & Stanistreet. (2017).	Adjusted Odds Ratio: Multivariate analysis has shown a significant association and the difference between 'reference' and the difference in adjusted odds ratio of the other category in comparison to the reference category is >2.	Adjusted Odds Ratio: Multivariate analysis has shown a significant association and the difference between 'reference' and the difference in adjusted odds ratio of the other category in comparison to the reference category is <2.	Multivariate analysis has not shown a significant association.
The benefit of the doubt or doubts over benefits? A systematic literature review of perceived risks of vaccines in European populations. Karafillakas & Larson. (2017).	A perception for vaccine hesitancy was mentioned in >20 studies.	A perception for vaccine hesitancy was mentioned in <20 studies.	Not mentioned et all.
Motivational and contextual determinants of HPV-vaccination uptake: A longitudinal study among mothers of girls invited for the HPV-vaccination. Pot et al. (2017).	Odds ratio uptake: 50% of the mothers. Multivariate analysis has shown a significant association and the difference between 'reference' and the difference in adjusted odds ratio of the other category in comparison to the reference category is >0.25. Standardized ß Intention: Univariate analysis has shown a significant association between the mean and the intention to receive the HPV-vaccine has a standardized ß outside -0.5 to 0.5.	Odds ratio uptake: 50% of the mothers. Multivariate analysis has shown a significant association and the difference between 'reference' and the difference in adjusted odds ratio of the other category in comparison to the reference category is <0.25. Standardized ß Intention: Univariate analysis has shown a significant association between the mean and the intention to receive the HPV-vaccine has a standardized ß between -0.5 to 0.5.	Multivariate analysis has not shown a significant association.
Determinants of students' willingness to accept a measles–mumps–rubella booster vaccination during a mumps outbreak: a cross-sectional study. Donkers et al. (2015).	Odds ratio Willingness: Multivariate analysis has shown a significant association and the difference between the odds ratio and the reference category '1' is >0.5.	Odds ratio Willingness: Multivariate analysis has shown a significant association and the difference between the odds ratio and the reference category '1' is <0.5.	Multivariate analysis has not shown a significant association.

Vaccine uptake determinants in The Netherlands. van Lier et al. (2014).	Odds ratio 'full' uptake: Multilevel logistic regression shows that the difference between the odds ratio and the 'reference-category' is >0.25.	Odds ratio 'full' uptake: Multilevel logistic regression shows that the difference between the odds ratio and the 'reference-category' is <0.25.	Multilevel logistic regression has not mentioned the odds ratio.

VI: Survey

Vragenlijst Vaccinatie

Introductie

Welkom bij deze vragenlijst! Wij vragen jullie deze vragenlijst voor de Universiteit Twente en de GGD in te vullen. Het doel van deze vragenlijst is te onderzoeken waarom jongeren van jullie leeftijd (14 t/m 18 jaar oud) zich wel of niet laten vaccineren.
Vaccinatie is het krijgen van een prik ter voorkoming van het krijgen van een besmettelijke ziekte. Vaccinatie wordt ook wel inenting genoemd. Het rijksvaccinatieprogramma bevat vaccinaties die worden aangeboden vanuit de overheid aan kinderen vanaf de geboorte tot 18 jarige leeftijd.

Welke informatie wordt verzameld?

Het volgende wordt tijdens het invullen van de vragenlijst aan je gevraagd:
- Vragen over de organisatie van het vaccinatieprogramma zoals communicatie en (social-) media.
- Vragen over je houding tegenover vaccinatie.
Vragen over de meningokokken ACWY-vaccinatie.
- Achtergrondgegevens: school; leeftijd; opleidingsniveau, religie en afkomst van je ouders en jezelf; en of je alle aangeboden vaccinaties hebt gehad.

Wat gebeurt er met jouw antwoorden?

De vragenlijst wordt online en anoniem ingevuld. Je naam zal binnen dit onderzoek niet worden gevraagd. Ook zullen antwoorden niet te herleiden zijn naar jou.
Degenen die toegang hebben tot de ingevulde gegevens zijn de onderzoekers en de begeleiders van de onderzoekers. De gegevens zullen 10 jaar worden bewaard op een server van de Universiteit Twente.

Handig om te weten

Het is van belang dat je de vragen goed leest voordat je antwoord geeft op de vraag en het is van belang dat je de toelichting (uitleg) knopjes bekijkt zodat je de vragen zo goed mogelijk kunt beantwoorden.
We willen graag jouw mening horen. Er bestaan dus geen goede of foute antwoorden. Alle antwoorden verwerken we vertrouwelijk en delen we niet met anderen.
Het invullen van de vragenlijst duurt +/- 10 minuten.

Toestemming tot vrijwillige deelname

Door op “volgende” te klikken en daarmee te starten met de vragenlijst, geef je toestemming tot vrijwillige deelname.

Einde blok: Informed Consent

Q1.1_Deelname_vac
Deel I: Vaccinatie
Heb je meegedaan aan het Rijksvaccinatieprogramma*?
Klik op de knop '* Toelichting' voor uitleg over de inhoud van het Rijksvaccinatieprogramma.
* Toelichting Ouders ontvangen 4-6 weken na de geboorte van hun kind een uitnodiging voor alle vaccinaties in de eerste 14 maanden. In het jaar dat kinderen 4 worden ontvangen ze een uitnodiging voor de DKTP vaccinatie. In het jaar dat kinderen 9 worden ontvangen ze een uitnodiging voor de laatste DTP- en BMR vaccinatie. Meisjes ontvangen in het jaar dat zij 13 worden een uitnodiging voor de HPV vaccinatie.

- ○ Nee (0)

○ Ja, gedeeltelijk, want ik heb niet alle vaccinaties gekregen die ik voor mijn leeftijd zou moeten hebben (1)

○ Ja, volledig, want ik heb alle vaccinaties gekregen die ik voor mijn leeftijd zou moeten hebben (2)

○ Weet ik niet (3)

Q1.3_info_zoeken Waar zoek jij informatie als je iets wilt weten over vaccinatie? Meerdere antwoorden mogelijk

- ☐ Internet pagina's (1)
- ☐ Social media zoals Facebook, Twitter of Instagram (2)
- ☐ Mijn ouder(s)/verzorger(s) (3)
- ☐ Mijn vrienden (4)
- ☐ Klasgenoten en/of leraar (5)
- ☐ Een arts of verpleegkundige (6)
- ☐ Ik zoek geen informatie op over vaccineren (7)
- ☐ Ik wil deze vraag niet beantwoorden (8)
- ☐ Anders, namelijk: (9)

Q1.4_info_bron
Hoe zou je geïnformeerd willen worden over vaccinaties om een keuze te kunnen maken of je je wilt laten vaccineren? (meerdere antwoorden mogelijk)

- ☐ Folder/brief (1)
- ☐ Website (2)

- [ ] Social media zoals Facebook, Twitter of Instagram (3)
- [ ] Tijdens een les (4)
- [ ] Informatie bijeenkomst op school (5)
- [ ] Informatie bijeenkomst buiten school (6)
- [ ] Digitale keuzehulp (een online hulpmiddel dat je helpt een keuze te maken) (7)
- [ ] App (8)
- [ ] Overheidscampagne (9)
- [ ] Via een gesprek met een arts of verpleegkundige (10)
- [ ] Via mijn ouder(s)/verzorger(s) (15)
- [ ] Ik heb geen behoefte aan informatie want ik weet al dat ik me laat vaccineren (11)
- [ ] Ik heb geen behoefte aan informatie want ik weet al dat ik me niet laat vaccineren (12)
- [ ] Anders, namelijk: (13) _____
- [ ] Ik wil deze vraag niet beantwoorden (14)

Q1.5_welke_info Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte(n)* en de vaccinatie daartegen zou je dan willen krijgen? (Meerdere antwoorden mogelijk). Klik op de knop '*Toelichting' voor meer informatie over de ziektes waartegen in het Rijksvaccinatieprogramma wordt gevaccineerd.

* Toelichting Difterie, Kinkhoest, Tetanus en Polio (DKTP/DTP), Bof, Mazelen en Rodehond (BMR),

Hepatitis B, Pneumokokken, HIB-ziekten (Haemophilus Influenzae type B), Meningokokkenziekte (MenACWY) en Baarmoederhalskanker (HPV).

- ☐ Het risico voor jongeren om de ziekte op te lopen (1)
- ☐ Aantal patiënten, ziekenhuisopnames en sterfte door deze ziekte bij jongeren (2)
- ☐ Ziekteverschijnselen bij jongeren (3)
- ☐ Wat er in een vaccinatie zit (4)
- ☐ Hoe goed een vaccinatie beschermt tegen het oplopen van de ziekte bij jongeren (5)
- ☐ Risico op bijwerkingen van de vaccinatie bij jongeren (6)
- ☐ Ervaring van andere jongeren (7)
- ☐ Ervaring in andere landen (8)
- ☐ Beschikbare onderzoeken die gedaan zijn naar de ziekte (9)
- ☐ Geen informatie (10)
- ☐ Anders, namelijk: (11) _____
- ☐ Ik wil deze vraag niet beantwoorden (12)

Start van blok: Deel II: Meningokokken

Q2.1A_uitnodiging
Deel 2: Vaccinatie tegen Meningokokken
Heb je een uitnodiging gekregen om de Meningokokken ACWY vaccinatie* te krijgen? Klik op de knop '* Toelichting' voor meer informatie over meningokokkenziekte en de Meningokokken ACWY vaccinatie. * Toelichting Meningokokkenziekte is een verzamelnaam voor ziekten die worden veroorzaakt door een bacterie, de meningokok. Deze bacterie kan ervoor zorgen dat iemand ziek wordt. Er bestaan verschillende typen van de meningokok. De Meningokokken ACWY is een vaccinatie die beschermt tegen de typen A, C, W en Y van meningokokkenziekte. Deze vaccinatie wordt sinds 2018 aangeboden aan kinderen op de leeftijd van 14 maanden en aan tieners tussen de leeftijd van

14-18 jaar oud.

- ○ Ja (1)
- ○ Nee (0)
- ○ Weet ik niet (3)
- ○ Ik wil deze vraag niet beantwoorden. (2)

Q2.1B_gevaccineerd
Heb je de Meningokokken ACWY-vaccinatie gekregen in 2018 of 2019? Klik op de knop '* Toelichting' voor meer informatie over meningokokkenziekte en de Meningokokken ACWY vaccinatie. * Toelichting Meningokokkenziekte is een verzamelnaam voor ziekten die worden veroorzaakt door een bacterie, de meningokok. Deze bacterie kan ervoor zorgen dat iemand ziek wordt. Er bestaan verschillende typen van de meningokok. De Meningokokken ACWY is een vaccinatie die beschermt tegen de typen A, C, W en Y. Deze vaccinatie wordt sinds 2018 aangeboden aan kinderen op de leeftijd van 14 maanden en aan tieners tussen de leeftijd van 14-18 jaar oud.

- ○ Ja (1)
- ○ Nee (0)
- ○ Weet ik niet (3)
- ○ Ik wil deze vraag niet beantwoorden. (2)

Q2.1C_intentie Geef antwoord op de volgende vraag:

Selecteer het bolletje wat overeenkomt met jouw antwoord op de vraag.

	Nee (0)	Waarschijnlijk niet (1)	Twijfel (2)	Waarschijnlijk wel (3)	Ja (4)
1. Ben je van plan om je te laten vaccineren tegen Meningokokken ACWY? (Q2.1C_intentie)	○	○	○	○	○

Q2.2 Geef je mening over de volgende stellingen:
Selecteer het bolletje wat overeenkomt met jouw mening over de stelling.

	Zeer slecht (0)	Slecht (1)	Niet goed en niet slecht (2)	Goed (3)	Zeer goed (4)
1. In het algemeen vind ik vaccinaties: (Q2.2_mening_vaccinaties)	○	○	○	○	○
2. Ik vind het vaccineren van jongeren tegen meningokokkenziekte: (Q2.2_mening_menacwy)	○	○	○	○	○

Q2.3 Geef je mening over de volgende stelling:
Selecteer het bolletje wat overeenkomt met jouw mening over de stelling.

	Niet ernstig (0)	Beetje ernstig (1)	Gemiddeld ernstig (2)	Heel ernstig (3)	Zeer ernstig (4)
1. Hoe ernstig is meningokokkenziekte volgens jou? (Q2.3_ernstig)	○	○	○	○	○

Q2.4 Geef je mening over de volgende stellingen:
Selecteer het bolletje wat overeenkomt met jouw mening over de stelling.

	Zeer klein (0)	Klein (1)	Niet groot en niet klein (2)	Groot (3)	Zeer groot (4)
1. Hoe groot denk je dat de kans is dat jij meningokokkenziekte krijgt als je je niet laat vaccineren? (Q2.4_vatbaarheid)	○	○	○	○	○
2. Hoe groot denk je dat de kans is dat jij meningokokkenziekte krijgt	○	○	○	○	○

als je je wel laat vaccineren? (Q2.4_effectiviteit)					
3. Hoe groot schat je de kans op bijwerkingen (ziek worden na de vaccinatie, pijnlijke arm) van de Meningokokken ACWY vaccinatie? (Q2.4_barrieres_bijwerking)	○	○	○	○	○
4. Hoe groot schat je de kans dat de Meningokokken ACWY vaccinatie pijnlijk is? (Q2.4_barriers_pijn)	○	○	○	○	○

Q2.5 Geef je mening over de volgende stellingen: Selecteer het bolletje wat overeenkomt met jouw mening over de stelling.

	Helemaal niet mee eens (0)	Enigszins mee oneens (1)	Niet eens en niet oneens (2)	Enigszins mee eens (3)	Helemaal mee eens (4)
1. Ik denk dat mijn ouders vinden dat ik me tegen meningokokkenziekte moet laten vaccineren. (Q2.5_ouders)	○	○	○	○	○
2. Ik denk dat de meeste vrienden zich tegen meningokokkenziekte laten vaccineren. (Q2.5_vrienden)	○	○	○	○	○
3. Ik denk dat de meeste klasgenoten zich tegen meningokokkenziekte laten vaccineren. (Q2.5_klasgenoten)	○	○	○	○	○
4. Ik heb voldoende kennis over meningokokkenziekte om een keuze te maken of ik mij	○	○	○	○	○

wel/niet wil laten vaccineren met de Meningokokken vaccinatie. (Q2.5_5)	

Einde blok: Deel II: Meningokokken

Start van blok: Deel III: Achtergrondgegevens

Q3.1_school
Deel III: Achtergrondgegevens
Op welke school zit je?

- ○ 1
- ○ 2
- ○ 3
- ○ 4

Q3.2_leeftijd
Wat is je leeftijd?

- ○ 13 (1)
- ○ 14 (2)
- ○ 15 (3)
- ○ 16 (4)
- ○ 17 (5)
- ○ 18 (6)

○ 19 (7)

Q3.3_geslacht
Wat is je geslacht?

○ Man (1)

○ Vrouw (2)

Q3.4_opl_tiener
Welke opleiding volg je?

○ Praktijkonderwijs (1)

○ VMBO-B (2)

○ VMBO-K (3)

○ VMBO-T (4)

○ HAVO (5)

○ VWO-Atheneum (6)

○ VWO-Gymnasium (7)

Q3.5_opl_oud
Wat is de hoogste opleiding die je ouders hebben gevolgd? Selecteer het bolletje wat overeenkomt met jouw antwoord op de vraag.

	Opleidingsniveau								
	Basisonderwijs (1)	VMBO (2)	HAVO (3)	VWO (4)	MBO (5)	HBO (6)	Universiteit (7)	Anders (8)	Weet ik niet (9)
Vader (Q3.5_opleiding_vader)	○	○	○	○	○	○	○	○	○

Moeder (Q3.5_opleiding_moeder)	○ ○ ○ ○ ○ ○ ○ ○

Q3.6_geloof_tiener
Welk geloof heb jijzelf?

- ○ Geen (0)
- ○ Rooms-katholiek (1)
- ○ Gereformeerd (2)
- ○ Protestant (3)
- ○ Islam (4)
- ○ Ander geloof (5)

Q3.7_geloof_ouders
Welk geloof hebben je ouders?

	Geloof						
	Geen (0)	Rooms-katholiek (1)	Gereformeerd (2)	Protestant (3)	Islam (4)	Ander geloof (5)	Weet ik niet (6)
Vader (Q3.7_geloof_vader)	○	○	○	○	○	○	○
Moeder (Q3.7_geloof_moeder)	○	○	○	○	○	○	○

Q3.8_afkomst_tiener
Waar ben je geboren?
* Toelichting Onder Oceanië valt een groot aantal eilanden in de Grote en Stille Oceaan waaronder Australië en Nieuw-Zeeland.

○ Nederland (1)

○ Westers land: Europa (geen Turkije of Nederland), Noord-Amerika, Oceanië*, Indonesië of Japan (2)

○ Niet-Westers land (3)

Q3.9_afkomst_ouders
Waar zijn je ouders geboren?
Selecteer het bolletje wat overeenkomt met jouw antwoord op de vraag.

* Toelichting Onder Oceanië valt een groot aantal eilanden in de Grote en Stille Oceaan waaronder Australië en Nieuw-Zeeland. Westers land: Europa (geen Turkije of Nederland), Noord-Amerika, Oceanië**, Indonesië of Japan.

	Afkomst		
	Nederland (1)	Westers land* (2)	Niet-Westers land (3)
Vader (Q3.9_afkomst_vader)	○	○	○
Moeder (Q3.9_afkomst_moeder)	○	○	○

Einde blok: Deel III: Achtergrondgegevens

VII: Data Collection

#	Code:	Question:	Answers:	Data type:
	Dependent variables			
1	Q2.1B_gevaccineerd	Heb je de Meningokokken ACWY vaccinatie gekregen in 2018 of 2019?	0 Nee 1 Ja 2 Ik wil deze vraag niet beantwoorden 3 Weet ik niet	Nominal
2	Q2.1C_intentie	Ben je van plan om je te laten vaccineren tegen Meningokokken ACWY?	0 Nee 1 Waarschijnlijk niet 2 Twijfel 3 Waarschijnlijk wel 4 Ja	Ordinal
	Independent variables: Likert-scale Geef je mening over de volgende stellingen. Selecteer het bolletje wat overeenkomt met jouw mening over de stelling.			
3	Q2.2_mening_vaccinaties	In het algemeen vind ik vaccinaties	0 Zeer slecht 1 Slecht 2 Niet goed en niet slecht 3 Goed 4 Zeer goed	Ordinal
4	Q2.2_mening_menacwy	Ik vind het vaccineren van jongeren tegen meningokokkenziekte	0 Zeer slecht 1 Slecht 2 Niet goed en niet slecht 3 Goed 4 Zeer goed	Ordinal
5	Q2.3_ernstig	Hoe ernstig is meningokokkenziekte volgens jou?	0 Niet ernstig 1 Beetje ernstig 2 Gemiddeld ernstig 3 Heel ernstig 4 Zeer ernstig	Ordinal
6	Q2.4_vatbaarheid	Hoe groot denk je dat de kans is dat jij meningokokkenziekte krijgt als je je niet laat vaccineren?	0 Zeer klein 1 Klein 2 Niet groot en niet klein 3 Groot 4 Zeer groot	Ordinal
7	Q2.4_effectiviteit	Hoe groot denk je dat de kans is dat jij meningokokkenziekte krijgt als je je wel laat vaccineren?	0 Zeer klein 1 Klein 2 Niet groot en niet klein 3 Groot 4 Zeer groot	Ordinal
8	Q2.4_barrieres_bijwerking	Hoe groot schat je de kans op bijwerkingen (ziek worden na de vaccinatie, pijnlijke arm) van de Meningokokken ACWY vaccinatie?	0 Zeer klein 1 Klein 2 Niet groot en niet klein 3 Groot 4 Zeer groot	Ordinal
9	Q2.4_barriers_pijn	Hoe groot schat je de kans dat de Meningokokken ACWY vaccinatie pijnlijk is?	0 Zeer klein 1 Klein 2 Niet groot en niet klein 3 Groot 4 Zeer groot	Ordinal
10	Q2.5_ouders	Ik denk dat mijn ouders vinden dat ik me tegen meningokokkenziekte moet laten vaccineren.	0 Zeer klein 1 Klein 2 Niet groot en niet klein 3 Groot 4 Zeer groot	Ordinal
11	Q2.5_vrienden	Ik denk dat de meeste vrienden zich tegen meningokokkenziekte laten vaccineren.	0 Zeer klein 1 Klein 2 Niet groot en niet klein 3 Groot 4 Zeer groot	Ordinal

12	Q2.5_klasgenoten	Ik denk dat de meeste klasgenoten zich tegen meningokokkenziekte laten vaccineren.	0 Zeer klein 1 Klein 2 Niet groot en niet klein 3 Groot 4 Zeer groot	Ordinal
13	Q2.5_5	Ik heb voldoende kennis over meningokokkenziekte om een keuze te maken of ik mij wel/niet wil laten vaccineren met de Meningokokken vaccinatie.	0 Zeer klein 1 Klein 2 Niet groot en niet klein 3 Groot 4 Zeer groot	Ordinal
	Independent variables: Background characteristics			
14	Q1.1_Deelname_vac	Heb je meegedaan aan het Rijksvaccinatieprogramma?	0 Nee 1 Ja, gedeeltelijk 2 Ja, volledig 3 Weet ik niet	Nominal
15	Q2.1A_uitnodiging	Heb je een uitnodiging gekregen om de Meningokokken ACWY vaccinatie te krijgen?	0 Nee 1 Ja 2 Ik wil deze vraag niet beantwoorden 3 Weet ik niet	Nominal
16	Q3.1_school	Op welke school zit je?	0 School 2 1 School 3	Nominal
17	Q3.2_leeftijd	Wat is je leeftijd?	0 13 1 14 2 15 3 16 4 17 5 18+	Ordinal
18	Q3.3_geslacht	Wat is je geslacht?	0 Man 1 Vrouw	Nominal
19	Q3.4_opl_tienercat	Welke opleiding volg je?	0 Praktijkonderwijs 1 VMBO-B 2 VMBO-K 3 VMBO-T 4 HAVO 5 VWO	Ordinal
20	Q3.5_opleiding_vadercat	Wat is de hoogste opleiding die je ouders hebben gevolgd? Vader.	1 Praktijkonderwijs 2 VMBO 3 HAVO 4 VWO 5 MBO 6 HBO 7 Universiteit 8 Anders 9 Weet ik niet Recode: 0 Laag (1, 2) 1 Midden (3, 4, 5) 2 Hoog (6, 7, 8, 9) Recode in 21b	Ordinal
21	Q3.5_opleiding_moedercat	Wat is de hoogste opleiding die je ouders hebben gevolgd? Moeder.	1 Praktijkonderwijs 2 VMBO 3 HAVO 4 VWO 5 MBO 6 HBO 7 Universiteit 8 Anders 9 Weet ik niet Recode:	b

			0 Laag (1, 2) 1 Midden (3, 4, 5) 2 Hoog (6, 7, 8, 9) Recode in 21b	
21b	Q3.5_hoogste_opleiding_laag	Wat is het hoogst genoten opleidingsniveau van je ouders? Laag	0 Laag 1 Midden 2 Hoog	Nominal
22	Q3.6_geloof_tiener	Welk geloof heb jijzelf?	0 Geen 1 Rooms-katholiek 2 Gereformeerd 3 Protestant 4 Islam 5 Ander geloof	Nominal
23	Q3.7_geloof_vader_1	Welk geloof hebben je ouders? Vader	0 Geen 1 Rooms-katholiek 2 Gereformeerd 3 Protestant 4 Islam 5 Ander geloof 6 Weet ik niet	Nominal
24	Q3.7_geloof_moeder_1	Welk geloof hebben je ouders? Moeder	0 Geen 1 Rooms-katholiek 2 Gereformeerd 3 Protestant 4 Islam 5 Ander geloof 6 Weet ik niet	Nominal
25	Q3.8_afkomst_tiener	Waar ben je geboren?	1 Nederland 2 Westers-land 3 Niet-Westers land Recode in 27b	Nominal
26	Q3.9_afkomst_vader_1	Waar zijn je ouders geboren? Vader	1 Nederland 2 Westers-land 3 Niet-Westers land Recode in 27b	Nominal
27	Q3.9_afkomst_moeder_1	Waar zijn je ouders geboren? Moeder	1 Nederland 2 Westers-land 3 Niet-Westers land Recode in 27b	Nominal
27b	Q3.9_afkomst_tiener_NL	Wat is je migratieachtergrond? NL	0 NL (tiener + beide ouders NL) 1 Eerste- of tweede generatie (minstens tiener of een van beide ouders niet van NL origine).	Nominal
	Independent variables: Information (Meerdere antwoorden mogelijk)			
28	Q1.3_info_zoeken	Waar zoek jij informatie als je iets wilt weten over vaccinatie?	1 Internet pagina's 2 Social media 3 Mijn ouders 4 Mijn vrienden 5 Mijn klasgenoten 6 Een zorgverlener 7 Ik zoek geen informatie op over vaccineren 8 Ik wil deze vraag niet beantwoorden 9 Anders, namelijk	Nominal

29	Q1.4_info_bron	Hoe zou je geïnformeerd willen worden over vaccinaties om een keuze te kunnen maken of je je wilt laten vaccineren?	1 Folder/brief 2 Website 3 Social media 4 Tijdens een les 5 Informatiebijeenkomst op school 6 Informatiebijeenkomst buiten school 7 Digitale keuzehulp 8 App 9 Overheidscampagne 10 Via een gesprek met een arts of verpleegkundige 11 Via mijn ouder(s)/verzorger(s) 12 Ik heb geen behoefte aan informatie want ik weet dat ik mij wil laten vaccineren. 13 Ik heb geen behoefte aan informatie want ik weet dat ik me niet laat vaccineren. 14. Anders, namelijk 15 Ik wil deze vraag niet beantwoorden.	Nominal
30	Q1.5_welke_info	Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte(n) en de vaccinatie daartegen zou je dan willen krijgen?	1 Het risico voor jongeren om de ziekte op te lopen 2 Aantal patiënten, ziekenhuisopnames en sterfte door deze ziekte bij jongeren 3 Ziekteverschijnselen bij jongeren 4 Wat er in een vaccinatie zit 5 Hoe goed een vaccinatie beschermt tegen het oplopen van de ziekte bij jongeren 6 Risico op bijwerkingen van de vaccinatie bij jongeren 7 Ervaring van andere jongeren 8 Ervaring in andere landen 9 Beschikbare onderzoeken die gedaan zijn naar de ziekte 10 Geen informatie 11 Anders, namelijk 12 Ik wil deze vraag niet beantwoorden.	Nominal

VIII: Data Management Plan

Subject:	Outcome:
Data Collection	- Questionnaire. Exported in .SAV format. - Qualtrics XM. University of Twente account.
Data Documentation	- Data is downloaded from Qualtrics and (prepared for) analyses using IBM SPSS Statistics Version 25.
Data Storage	- Data is stored at Qualtrics where respondents have filled in the questionnaire. - Data is stored at the laptop of the researcher and a back-up is made on iCloud. The laptop and iCloud back-up of the researcher are secured with a password.
Data Security	- The data has a small likelihood of being traceable back to specific persons. The combination of 'school' and background characteristics. The name of the schools will be transformed to 'School 1' and 'School 2'. - The researcher and his first- and second supervisor are the only ones who have access to the data. First- and second supervisor have access to the data through the BMS-server. - When the research is completed access is handled through the first supervisor (Prof. Dr. A. Need) and the researcher, which in turn will consult the first supervisor before access is granted to another person than mentioned afore.
Data Selection and Preservation	- The data is obliged to be saved for 10-years.
Data Availability	- After the study has been finished, the data will be saved on the central and secured BMS-server. - Prof. Dr. A. Need is responsible for archiving the data.

IX: SPSS-syntax

```
* Encoding: UTF-8.

* Dataset openen.
GET
  FILE='/Users/tomvdberg/Documents/UT Master Health Sciences/Q3 + Q4/Vragenlijst Vaccinatie - Officieel_23 april 2019_12.45.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.

* Stap 1: Opschonen Data.
* Stap 1.1: Compleet ingevulde responses worden meegenomen.
* Vragenlijsten worden geincludeerd wanneer SPSS aangeeft 'Finished=1' en de characteristics volledig zijn ingevuld (geen missende waarden).
*Op deze manier kunnen analyses worden gemaakt o.b.v. de characteristics en zijn missende antwoorden verwijderd van respondenten die de vragenlijst niet hebben afgerond.
* School 1 & 4 hebben niet deelgenomen aan dit onderzoek, echter wel een respondent hiervan. Deze respondent is geexcludeerd.

SELECT IF Finished=1.
EXECUTE.

SELECT IF (Nmiss(Q3.1_school,Q3.2_leeftijd,Q3.3_geslacht,Q3.4_opl_tiener,Q3.5_opleiding_vader_1,Q3.5_opleiding_moeder_1,Q3.6_geloof_tiener,Q3.7_geloof_vader_1,Q3.7_geloof_moeder_1,Q3.8_afkomst_tiener,Q3.9_afkomst_vader_1,Q3.9_afkomst_moeder_1)<1).
EXECUTE.

SELECT IF (Q3.1_school=2 OR Q3.1_school=3).
EXECUTE.

* Stap 1.2: Indeling onderwijsniveau kind + ouders

RECODE Q3.4_opl_tiener (4=0)(5=1)(6=2)(7=3) INTO Q3.4_opl_tienercat.
VARIABLE LABELS Q3.4_opl_tienercat 'Q3.4_opl_tienercat'.
VALUE LABELS    Q3.4_opl_tienercat 0 'VMBO-T' 1 'HAVO' 2 'VWO-A' 3 'VWO-G'.
EXECUTE.

RECODE Q3.5_opleiding_vader_1 (1=0)(2=0)(3=1)(4=1)(5=1)(6=2)(7=2)(8=8)(9=9) INTO Q3.5_opleiding_vadercat.
VARIABLE LABELS Q3.5_opleiding_vadercat 'Q3.5_opleiding_vadercat'.
VALUE LABELS Q3.5_opleiding_vadercat 0 'Laag' 1 'Midden' 2 'Hoog' 8 'Anders' 9 'Weet ik niet'.
EXECUTE.

RECODE Q3.5_opleiding_moeder_1 (1=0)(2=0)(3=1)(4=1)(5=1)(6=2)(7=2)(8=8)(9=9) INTO Q3.5_opleiding_moedercat.
VARIABLE LABELS Q3.5_opleiding_moedercat 'Q3.5_opleiding_moedercat'.
VALUE LABELS Q3.5_opleiding_moedercat 0 'Laag' 1 'Midden' 2 'Hoog' 8 'Anders' 9 'Weet ik niet'.
EXECUTE.

* Vraag 1.3, 1.4, 1.5 aanpassen door 'missing values to coderen naar 0'.

RECODE Q1.3_info_zoeken_1 Q1.3_info_zoeken_2 Q1.3_info_zoeken_3 Q1.3_info_zoeken_4
    Q1.3_info_zoeken_5 Q1.3_info_zoeken_6 Q1.3_info_zoeken_7 Q1.3_info_zoeken_8 Q1.3_info_zoeken_9
    Q1.4_info_bron_1 Q1.4_info_bron_2 Q1.4_info_bron_3 Q1.4_info_bron_4 Q1.4_info_bron_5
    Q1.4_info_bron_6 Q1.4_info_bron_7 Q1.4_info_bron_8 Q1.4_info_bron_9 Q1.4_info_bron_10
    Q1.4_info_bron_15 Q1.4_info_bron_11 Q1.4_info_bron_12 Q1.4_info_bron_13 Q1.4_info_bron_14
    Q1.5_welke_info_1 Q1.5_welke_info_2 Q1.5_welke_info_3 Q1.5_welke_info_4 Q1.5_welke_info_5
    Q1.5_welke_info_6 Q1.5_welke_info_7 Q1.5_welke_info_8 Q1.5_welke_info_9 Q1.5_welke_info_10
    Q1.5_welke_info_11 Q1.5_welke_info_12 (SYSMIS=0) (1=1).
EXECUTE.

* Nieuw variabele aanmaken om het hoogst genoten opleidingsniveau van het huishouden te kunnen bepalen.

IF (Q3.5_opleiding_vadercat=0 AND Q3.5_opleiding_moedercat=0) Q3.5_hoogste_opleiding_laag=0.
```

```
IF (Q3.5_opleiding_vadercat=1 AND Q3.5_opleiding_moedercat=0) Q3.5_hoogste_opleiding_laag=1.
IF (Q3.5_opleiding_vadercat=2 AND Q3.5_opleiding_moedercat=0) Q3.5_hoogste_opleiding_laag=2.
IF (Q3.5_opleiding_vadercat=0 AND Q3.5_opleiding_moedercat=1) Q3.5_hoogste_opleiding_laag=1.
IF (Q3.5_opleiding_vadercat=1 AND Q3.5_opleiding_moedercat=1) Q3.5_hoogste_opleiding_laag=1.
IF (Q3.5_opleiding_vadercat=2 AND Q3.5_opleiding_moedercat=1) Q3.5_hoogste_opleiding_laag=2.
IF (Q3.5_opleiding_vadercat=0 AND Q3.5_opleiding_moedercat=2) Q3.5_hoogste_opleiding_laag=2.
IF (Q3.5_opleiding_vadercat=1 AND Q3.5_opleiding_moedercat=2) Q3.5_hoogste_opleiding_laag=2.
IF (Q3.5_opleiding_vadercat=2 AND Q3.5_opleiding_moedercat=2) Q3.5_hoogste_opleiding_laag=2.
IF (Q3.5_opleiding_vadercat=0 AND Q3.5_opleiding_moedercat=0) Q3.5_hoogste_opleiding_laag=0.
IF (Q3.5_opleiding_vadercat=0 AND Q3.5_opleiding_moedercat=8) Q3.5_hoogste_opleiding_laag=0.
IF (Q3.5_opleiding_vadercat=1 AND Q3.5_opleiding_moedercat=8) Q3.5_hoogste_opleiding_laag=1.
IF (Q3.5_opleiding_vadercat=2 AND Q3.5_opleiding_moedercat=8) Q3.5_hoogste_opleiding_laag=2.
IF (Q3.5_opleiding_vadercat=0 AND Q3.5_opleiding_moedercat=9) Q3.5_hoogste_opleiding_laag=0.
IF (Q3.5_opleiding_vadercat=1 AND Q3.5_opleiding_moedercat=9) Q3.5_hoogste_opleiding_laag=1.
IF (Q3.5_opleiding_vadercat=2 AND Q3.5_opleiding_moedercat=9) Q3.5_hoogste_opleiding_laag=2.
IF (Q3.5_opleiding_vadercat=8 AND Q3.5_opleiding_moedercat=0) Q3.5_hoogste_opleiding_laag=0.
IF (Q3.5_opleiding_vadercat=8 AND Q3.5_opleiding_moedercat=1) Q3.5_hoogste_opleiding_laag=1.
IF (Q3.5_opleiding_vadercat=8 AND Q3.5_opleiding_moedercat=2) Q3.5_hoogste_opleiding_laag=2.
IF (Q3.5_opleiding_vadercat=9 AND Q3.5_opleiding_moedercat=0) Q3.5_hoogste_opleiding_laag=0.
IF (Q3.5_opleiding_vadercat=9 AND Q3.5_opleiding_moedercat=1) Q3.5_hoogste_opleiding_laag=1.
IF (Q3.5_opleiding_vadercat=9 AND Q3.5_opleiding_moedercat=2) Q3.5_hoogste_opleiding_laag=2.
ADD VALUE LABELS Q3.5_hoogste_opleiding_laag (0) Laag (1) Midden (2) Hoog.
EXECUTE.

* Verwijderen van variabelen die niet worden gebruikt.

DELETE VARIABLES Q3.4_opl_tiener Q3.5_opleiding_vader_1 Q3.5_opleiding_moeder_1 StartDate EndDate Status IPAddress
Progress Duration__in_seconds_
Finished RecordedDate ResponseId RecipientLastName RecipientFirstName RecipientEmail ExternalReference
LocationLatitude LocationLongitude
DistributionChannel UserLanguage Q1.2a_intentie_n_gevac Q1.2b_Intentie_gevac Q1.6_mening_gezondheid
Q1.6_mening_religie Q1.6_mening_inhoud_rvp
Q1.6_mening_vertrouwen Q1.6_mening_veilig Q1.6_mening_9 Q1.6_mening_plek Q1.6_mening_10 Q1.7A_zorgen_1
Q1.7B_zorgen_open Q1.8_tijd
Q1.9_makkelijker_vac.
EXECUTE.

* Het leesbaarder maken van de labels

VARIABLE LABELS Q1.1_Deelname_vac 'Ben je volledig gevaccineerd?'.
VARIABLE LABELS Q1.3_info_zoeken_1 'Waar zoek jij informatie als je iets wilt weten over vaccinatie? Internet paginas'.
VARIABLE LABELS Q1.3_info_zoeken_2 'Waar zoek jij informatie als je iets wilt weten over vaccinatie? Social Media'.
VARIABLE LABELS Q1.3_info_zoeken_3 'Waar zoek jij informatie als je iets wilt weten over vaccinatie? Mijn ouders/verzorgers'.
VARIABLE LABELS Q1.3_info_zoeken_4 'Waar zoek jij informatie als je iets wilt weten over vaccinatie? Vrienden'.
VARIABLE LABELS Q1.3_info_zoeken_5 'Waar zoek jij informatie als je iets wilt weten over vaccinatie? Klasgenoten/leraar'.
VARIABLE LABELS Q1.3_info_zoeken_6 'Waar zoek jij informatie als je iets wilt weten over vaccinatie? Arts of verpleegkundige'.
VARIABLE LABELS Q1.3_info_zoeken_7 'Waar zoek jij informatie als je iets wilt weten over vaccinatie? Ik zoek geen informatie op'.
VARIABLE LABELS Q1.3_info_zoeken_8 'Waar zoek jij informatie als je iets wilt weten over vaccinatie? Ik wil deze vraag niet beantwoorden'.
VARIABLE LABELS Q1.3_info_zoeken_9 'Waar zoek jij informatie als je iets wilt weten over vaccinatie? Anders, namelijk'.
VARIABLE LABELS Q1.4_info_bron_1 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Folder/brief'.
VARIABLE LABELS Q1.4_info_bron_2 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Website'.
VARIABLE LABELS Q1.4_info_bron_3 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Social media'.
VARIABLE LABELS Q1.4_info_bron_4 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Tijdens een les'.
VARIABLE LABELS Q1.4_info_bron_5 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Informatiebijeenkomst op school'.
```

VARIABLE LABELS Q1.4_info_bron_6 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Informatiebijeenkomst buiten school'.
VARIABLE LABELS Q1.4_info_bron_7 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Digitale keuzehulp'.
VARIABLE LABELS Q1.4_info_bron_8 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? App'.
VARIABLE LABELS Q1.4_info_bron_9 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Overheidscampagne'.
VARIABLE LABELS Q1.4_info_bron_10 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Via een gesprek met een arts of verpleegkundige'.
VARIABLE LABELS Q1.4_info_bron_11 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Ik heb geen behoefte aan informatie, ik laat me vaccineren'.
VARIABLE LABELS Q1.4_info_bron_12 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Ik heb geen behoefte aan informatie, ik laat me niet vaccineren'.
VARIABLE LABELS Q1.4_info_bron_13 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Anders, namelijk'.
VARIABLE LABELS Q1.4_info_bron_14 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Ik wil deze vraag niet beantwoorden'.
VARIABLE LABELS Q1.4_info_bron_15 'Hoe zou jij geinformeerd willen worden over vaccinaties om een keuze te maken of je je wilt laten vaccineren? Mijn ouders/verzorgers'.
VARIABLE LABELS Q1.5_welke_info_1 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Risico op ziekte'.
VARIABLE LABELS Q1.5_welke_info_2 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Aantal patienten, zkh opnames en sterfte'.
VARIABLE LABELS Q1.5_welke_info_3 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Ziekteverschijnselen'.
VARIABLE LABELS Q1.5_welke_info_4 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Inhoud vaccinatie'.
VARIABLE LABELS Q1.5_welke_info_5 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Bescherming vaccinatie'.
VARIABLE LABELS Q1.5_welke_info_6 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Risico op bijwerkingen'.
VARIABLE LABELS Q1.5_welke_info_7 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Ervaringen andere jongeren'.
VARIABLE LABELS Q1.5_welke_info_8 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Ervaringen andere landen'.
VARIABLE LABELS Q1.5_welke_info_9 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Beschikbare onderzoeken over vaccin(atie)'.
VARIABLE LABELS Q1.5_welke_info_10 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Geen informatie'.
VARIABLE LABELS Q1.5_welke_info_11 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Anders, namelijk'.
VARIABLE LABELS Q1.5_welke_info_12 'Als je een vaccinatie krijgt aangeboden, welke informatie over de ziekte en de vaccinatie daartegen zou je dan willen krijgen? Ik wil deze vraag niet beantwoorden'.
VARIABLE LABELS Q2.1A_uitnodiging 'Heb je een uitnodiging gekregen om de MenACWY te krijgen?'.
VARIABLE LABELS Q2.1B_gevaccineerd 'Heb je de MenACWY-vaccinatie gekregen in 2018/2019?'.
VARIABLE LABELS Q2.1C_intentie 'Ben je van plan om je te laten vaccineren tegen meningokokken ACWY?'.
VARIABLE LABELS Q2.2_mening_vaccinaties 'Stelling: In het algemeen vind ik vaccinaties.'.
VARIABLE LABELS Q2.2_mening_menacwy 'Stelling: Ik vind het vaccineren van jongeren tegen meningokokkenziekte.'.
VARIABLE LABELS Q2.3_ernstig 'Stelling: Hoe ernstig is meningokokkenziekte volgens jou?'.
VARIABLE LABELS Q2.4_vatbaarheid 'Stelling: Hoe groot denk je dat de kans is dat je meningokokkenziekte krijgt als je je niet laat vaccineren?'.
VARIABLE LABELS Q2.4_effectiviteit 'Stelling: Hoe groot denk je dat de kans is dat je meningokokkenziekte krijgt als je je wel laat vaccineren?'.
VARIABLE LABELS Q2.4_barrieres_bijwerking 'Stelling: Hoe groot schat je de kans op bijwerkingen van de MenACWY vaccinatie?'.
VARIABLE LABELS Q2.4_barriers_pijn 'Stelling: Hoe groot denk je dat de kans is dat de MenACWY pijnlijk is?'.
VARIABLE LABELS Q2.5_ouders 'Stelling: Ik denk dat mijn ouders vinden dat ik me tegen meningokokkenziekte moet laten vaccineren.'.
VARIABLE LABELS Q2.5_vrienden 'Stelling: Ik denk dat de meeste vrienden zich tegen meningokokkenziekte laten vaccineren.'.
VARIABLE LABELS Q2.5_klasgenoten 'Stelling: Ik denk dat de meeste klasgenoten zich tegen meninokokkenziekte laten vaccineren.'.

```
VARIABLE LABELS Q2.5_5 'Stelling: Ik heb voldoende kennis over meningokokkenziekte of ik mij wil laten vaccineren met de
MenACWY vaccinatie.'.

* Stap 2: Univariate analyse

* Stap 2.1: Descriptives
* Creeren van frequencies tabel op de background characteristics

FREQUENCIES VARIABLES=Q1.1_Deelname_vac Q2.1A_uitnodiging Q3.1_school Q3.2_leeftijd Q3.3_geslacht
   Q3.4_opl_tienercat Q3.5_opleiding_vadercat Q3.5_opleiding_moedercat Q3.6_geloof_tiener
   Q3.7_geloof_vader_1 Q3.7_geloof_moeder_1 Q3.8_afkomst_tiener Q3.9_afkomst_vader_1
   Q3.9_afkomst_moeder_1
  /ORDER=ANALYSIS.

* Stap 2.2: Bekijken afhankelijke variabelen.

FREQUENCIES VARIABLES=Q2.1B_gevaccineerd.

FREQUENCIES VARIABLES=Q2.1C_intentie
  /ORDER=ANALYSIS.

DESCRIPTIVES VARIABLES = Q2.1C_intentie.

* Stap 2.3: Bekijken afhankelijk variabele Uptake
** Uitsplitsen tabel Q2.1B o.b.v. Q2.1A. Uitnodiging beinvloedt deze afhankelijke variabele.
* Personen die wel een uitnodiging hebben gehad en zijn gegaan is de uptake de afhankelijk variabele.

FREQUENCIES VARIABLES=Q2.1A_uitnodiging.

SORT CASES BY Q2.1A_uitnodiging.
SPLIT FILE BY Q2.1A_uitnodiging.
FREQUENCIES    VARIABLES=Q2.1B_gevaccineerd.
SPLIT FILE OFF.

* Stap 2.4: Bekijken afhankelijk variabele intention
* Personen die de MenACWY-vaccinatie niet hebben gehad is intention de afhankelijke variabele.

FREQUENCIES VARIABLES=Q2.1C_intentie.

* Stap 2.5: Bekijken responses op meerkeuzevragen Q1.3, 1.4, 1.5.

* Stap 2.5.1: Q1.3. Multi-response

MULT RESPONSE GROUPS=$Q1.3_mr_info_zoeken (q1.3_info_zoeken_1 q1.3_info_zoeken_2 q1.3_info_zoeken_3
   q1.3_info_zoeken_4 q1.3_info_zoeken_5 q1.3_info_zoeken_6 q1.3_info_zoeken_7 q1.3_info_zoeken_8
   q1.3_info_zoeken_9 (1))
  /FREQUENCIES=$Q1.3_mr_info_zoeken.

* Stap 2.5.2: Q1.4. Multi-response

MULT RESPONSE GROUPS=$Q1.4_mr_info_bron_1 (q1.4_info_bron_1 q1.4_info_bron_2 q1.4_info_bron_3
   q1.4_info_bron_4 q1.4_info_bron_5 q1.4_info_bron_6 q1.4_info_bron_7 q1.4_info_bron_8
   q1.4_info_bron_9 q1.4_info_bron_10 q1.4_info_bron_15 q1.4_info_bron_11 q1.4_info_bron_12
   q1.4_info_bron_13 q1.4_info_bron_14 (1))
  /FREQUENCIES=$Q1.4_mr_info_bron_1.

* Stap 2.5.3: Q1.5. Multi-response

MULT RESPONSE GROUPS=$Q1.5_mr_welke_info (q1.5_welke_info_1 q1.5_welke_info_2
   q1.5_welke_info_3 q1.5_welke_info_4 q1.5_welke_info_5 q1.5_welke_info_6 q1.5_welke_info_7
   q1.5_welke_info_8 q1.5_welke_info_9 q1.5_welke_info_10 q1.5_welke_info_11 q1.5_welke_info_12 (1))
  /FREQUENCIES=$Q1.5_mr_welke_info.
```

```
* Stap 3: Bivariate analyse

* Stap 3.1: Missende waarden geven indien mensen niet weten of ze gevaccineerd zijn en ze niet weten of ze hebben deelgenomen aan RVP.

MISSING VALUES Q1.1_Deelname_vac (3).
EXECUTE.

* Maken van het variabele voor de uptake van de MenACWY-vaccinatie campagne.

IF (Q2.1A_uitnodiging=1 AND Q2.1B_gevaccineerd=0) Q2.1B_uptake_menacwy=0.
IF (Q2.1A_uitnodiging=1 AND Q2.1B_gevaccineerd=1) Q2.1B_uptake_menacwy=1.
ADD VALUE LABELS Q2.1B_uptake_menacwy 0 'Nee' 1 'Ja'.
VARIABLE LABELS Q2.1B_uptake_menacwy 'Heb je de MenACWY-vaccinatie in 2018/2019 gekregen in de campagne? Nee.'.
EXECUTE.

* Stap 3.1: Maken van categorieen voor het variabele geloof, migratieachtergrond en leeftijd.
* Stap 3.1.1: Geloof van tiener.

RECODE Q3.6_geloof_tiener (0=0)(1=3)(2=1)(3=3)(4=2)(5=3) INTO Q3.6_geloof_tiener_geen.
VARIABLE LABELS Q3.6_geloof_tiener_geen 'Q3.6_geloof_tiener_geen'.
VALUE LABELS Q3.6_geloof_tiener_geen 0 'Geen geloof' 1 'Gereformeerd' 2 'Islam' 3 'Ander Geloof / RK / Protestant'.
EXECUTE.


* Stap 3.1.2: Geloof van vader.
RECODE Q3.7_geloof_vader_1 (0=0)(1=3)(2=1)(3=3)(4=2)(5=3) INTO Q3.7_geloof_vader_geen.
VARIABLE LABELS Q3.7_geloof_vader_geen 'Q3.7_geloof_vader_geen'.
VALUE LABELS Q3.7_geloof_vader_geen 0 'Geen geloof' 1 'Gereformeerd' 2 'Islam' 3 'Ander Geloof / RK / Protestant'.
EXECUTE.

* Stap 3.1.3: Geloof van moeder

RECODE Q3.7_geloof_moeder_1 (0=0)(1=3)(2=1)(3=3)(4=2)(5=3) INTO Q3.7_geloof_moeder_geen.
VARIABLE LABELS Q3.7_geloof_moeder_geen 'Q3.7_geloof_moeder_geen'.
VALUE LABELS Q3.7_geloof_moeder_geen 0 'Geen geloof' 1 'Gereformeerd' 2 'Islam' 3 'Ander Geloof / RK / Protestant'.
EXECUTE.

* VWO-A en VWO-G veranderen naar 1 variabele

RECODE Q3.4_opl_tienercat (0=0)(1=1)(2=2)(3=2).
VALUE LABELS    Q3.4_opl_tienercat 0 'VMBO-T' 1 'HAVO' 2 'VWO'.
EXECUTE.

* Stap 3.1.4: Migratieachtergrond
* 3.1.4 Nieuwe variabele ouders NL / niet NL.

IF (Q3.9_afkomst_vader_1=1 AND Q3.9_afkomst_moeder_1=1) Q3.9_afkomst_ouders=0.
IF (Q3.9_afkomst_vader_1=2 AND Q3.9_afkomst_moeder_1=1) Q3.9_afkomst_ouders=1.
IF (Q3.9_afkomst_vader_1=3 AND Q3.9_afkomst_moeder_1=1) Q3.9_afkomst_ouders=1.
IF (Q3.9_afkomst_vader_1=1 AND Q3.9_afkomst_moeder_1=2) Q3.9_afkomst_ouders=1.
IF (Q3.9_afkomst_vader_1=1 AND Q3.9_afkomst_moeder_1=3) Q3.9_afkomst_ouders=1.
IF (Q3.9_afkomst_vader_1=2 AND Q3.9_afkomst_moeder_1=2) Q3.9_afkomst_ouders=1.
IF (Q3.9_afkomst_vader_1=3 AND Q3.9_afkomst_moeder_1=3) Q3.9_afkomst_ouders=1.
ADD VALUE LABELS Q3.9_afkomst_ouders (0) NL (1) Niet-NL.
EXECUTE.

* Migratieachtergrond bepalen

IF (Q3.8_afkomst_tiener=1 AND Q3.9_afkomst_ouders=0) Q3.9_afkomst_tiener_NL=0.
IF (Q3.8_afkomst_tiener=2) Q3.9_afkomst_tiener_NL=1.
IF (Q3.8_afkomst_tiener=3 ) Q3.9_afkomst_tiener_NL=1.
IF (Q3.8_afkomst_tiener=1 AND Q3.9_afkomst_ouders=1) Q3.9_afkomst_tiener_NL=1.
```

```
ADD VALUE LABELS Q3.9_afkomst_tiener_NL (0) NL (1) Eerste generatie en tweede generatie.
EXECUTE.

* Stap 3.1.5: Leeftijd categoriseren naar 18+.

RECODE Q3.2_leeftijd (1=0)(2=1)(3=2)(4=3)(5=4)(6=5)(7=5).
VALUE LABELS Q3.2_leeftijd 0 '13' 1 '14' 2 '15' 3 '16' 4 '17' 5 '18+'.
EXECUTE.

* Stap 3.1.6: Dummy's aanmaken voor geslacht

RECODE Q3.3_geslacht (1=0) (2=1).
VALUE LABELS Q3.3_geslacht 0 'Man' 1 'Vrouw'.
EXECUTE.

* Stap 3.1.7: Dummy's aanmaken voor school

RECODE Q3.1_school (2=0) (3=1).
VALUE LABELS Q3.1_school 0 'School 1Z' 1 'School 2A'.
EXECUTE.

* Stap 3.1.8: Vergroten leesbaarheid, labels aanpassen en verwijderen
.
VARIABLE LABELS Q3.4_opl_tienercat 'Welk opleidingsniveau volg je? VMBO-T'.
VARIABLE LABELS Q3.6_geloof_tiener_geen 'Welk geloof heb je? Geen'.
VARIABLE LABELS Q3.7_geloof_vader_geen 'Welk geloof heeft je vader? Geen'.
VARIABLE LABELS Q3.7_geloof_moeder_geen 'Welk geloof heeft je moeder? Geen'.
VARIABLE LABELS Q3.5_hoogste_opleiding_laag 'Wat is het hoogst genoten opleidingsniveau van je ouders? Laag'.
VARIABLE LABELS Q3.9_afkomst_tiener_NL 'Wat is je migratieachtergrond? NL'.

DELETE VARIABLES Q3.8_afkomst_tiener Q3.9_afkomst_vader_1 Q3.9_afkomst_moeder_1 Q3.5_opleiding_vadercat
Q3.5_opleiding_moedercat Q3.9_afkomst_ouders Q3.6_geloof_tiener Q3.7_geloof_vader_1 Q3.7_geloof_moeder_1
Q2.1A_uitnodiging Q2.1B_gevaccineerd.
EXECUTE.

** Creeren van frequencies tabel voor variabele uptake

SORT CASES BY Q2.1B_uptake_menacwy.
SPLIT FILE BY Q2.1B_uptake_menacwy.
FREQUENCIES Q1.1_Deelname_vac Q3.1_school Q3.2_leeftijd Q3.3_geslacht Q3.4_opl_tienercat
Q3.5_hoogste_opleiding_laag Q3.6_geloof_tiener_geen
Q3.7_geloof_vader_geen Q3.7_geloof_moeder_geen Q3.9_afkomst_tiener_NL.
SPLIT FILE OFF.

** Creeren van van frequencies tabel voor variabele intentie.

SORT CASES BY Q2.1C_intentie.
SPLIT FILE BY Q2.1C_intentie.
FREQUENCIES Q1.1_Deelname_vac Q3.1_school Q3.2_leeftijd Q3.3_geslacht Q3.4_opl_tienercat
Q3.5_hoogste_opleiding_laag Q3.6_geloof_tiener_geen
Q3.7_geloof_vader_geen Q3.7_geloof_moeder_geen Q3.9_afkomst_tiener_NL.
SPLIT FILE OFF.

* Stap 3.2: Means op uptake Q2.1B

MEANS VARIABLES Q2.1B_uptake_menacwy BY Q1.1_Deelname_vac Q3.1_school Q3.2_leeftijd Q3.3_geslacht
Q3.6_geloof_tiener_geen
  Q3.7_geloof_vader_geen Q3.7_geloof_moeder_geen Q3.9_afkomst_tiener_NL Q3.4_opl_tienercat
Q3.5_hoogste_opleiding_laag Q2.5_5 /  STATISTICS  =ANOVA.

* Stap 3.3: Means op Q2.1C intentie
```

```
MEANS VARIABLES Q2.1C_intentie BY Q1.1_Deelname_vac Q3.1_school Q3.2_leeftijd Q3.3_geslacht
Q3.6_geloof_tiener_geen
  Q3.7_geloof_vader_geen Q3.7_geloof_moeder_geen Q3.9_afkomst_tiener_NL Q3.4_opl_tienercat
Q3.5_hoogste_opleiding_laag Q2.5_5 /  STATISTICS  =ANOVA.

* Stap 3.4.1: Correlatie Uptake op Likert

NONPAR CORR
 /VARIABLES= Q2.1B_uptake_menacwy Q2.2_mening_vaccinaties Q2.2_mening_menacwy
Q2.3_ernstig Q2.4_vatbaarheid Q2.4_effectiviteit Q2.4_barrieres_bijwerking Q2.4_barriers_pijn
Q2.5_ouders Q2.5_vrienden Q2.5_klasgenoten
 /PRINT SPEARMAN TWOTAIL NOSIG
 /MISSING=PAIRWISE.

* Stap 3.4.2: Correlatie Intentie op Likert

NONPAR CORR
 /VARIABLES= Q2.1C_intentie Q2.2_mening_vaccinaties Q2.2_mening_menacwy
Q2.3_ernstig Q2.4_vatbaarheid Q2.4_effectiviteit Q2.4_barrieres_bijwerking Q2.4_barriers_pijn
Q2.5_ouders Q2.5_vrienden Q2.5_klasgenoten
 /PRINT SPEARMAN TWOTAIL NOSIG
 /MISSING=PAIRWISE.
```

X: Informed Consent Parents

Betreft: Onderzoek Rijksvaccinatieprogramma onder jongeren

Geachte Ouder(s)/Verzorger(s),

In het kader van ons afstudeeronderzoek voor de master Gezondheidswetenschappen aan de Universiteit Twente doen wij een onderzoek naar de dalende vaccinatiegraad van het Rijksvaccinatieprogramma in Nederland. Wij richten ons hierbij op de leeftijdsgroep 14 tot 18 jaar en hun redenen om zich wel/niet te laten vaccineren. Het doel van dit onderzoek is om inzicht te krijgen in de behoeftes van deze leeftijdsgroep omtrent rijksvaccinatie. Aangezien onze onderzoeksgroep in de leeftijd valt waarin toestemming van de ouder(s)/verzorger(s) nodig is voor deelname vragen wij dit aan u middels deze e-mail.
Wij sturen u deze e-mail om u te informeren dat uw kind op een school zit waarbij tussen 15 en 26 april 2019 een vragenlijst van ongeveer 10 minuten zal worden afgenomen.

Welke informatie wordt verzameld?
De volgende informatie wordt in de vragenlijst aan uw kind gevraagd:

- Demografische gegevens: school, leeftijd, opleidingsniveau van kind en ouder(s)/verzorger(s), religie van kind en ouder(s)/verzorger(s) en etnische achtergrond/afkomst van kind en ouder(s)/verzorger(s).
- Vragen omtrent de organisatie van het rijksvaccinatieprogramma zoals communicatie en (social-) media.
- Vragen omtrent individuele en sociale invloeden zoals de houding tegenover vaccinatie.
- Vragen omtrent vaccinatie specifieke issues zoals de invoer van een nieuwe vaccinatie.

Wat vragen we van u als ouder(s)/verzorger(s)?
Voor het invullen van de vragenlijst is het handig dat uw kind weet of hij of zij alle aangeboden vaccinaties (vanuit het Rijksvaccinatieprogramma) heeft gehad, dit zal namelijk aan uw kind worden gevraagd. Wij zouden het erg waarderen als u dit met uw kind bespreekt zodat hij/zij antwoord op deze vraag kan geven.

Hoe gaan wij om met de verzamelde gegevens?
De vragenlijst wordt online en anoniem ingevuld. Hoe bewaren en gebruiken we de informatie die uw kind ons geeft?

- De kinderen ontvangen voor deelname aan het onderzoek een link die hetzelfde is voor alle deelnemende kinderen. De naam van uw kind zal binnen dit onderzoek niet worden gevraagd. De antwoorden in de vragenlijst worden dus anoniem verwerkt, waardoor de vragenlijsten niet terug te herleiden zijn naar uw kind.
- Degenen die toegang hebben tot de gegevens zijn de onderzoekers en diens begeleiders. De school van uw kind heeft geen toegang tot de ingevulde gegevens. De gegevens zullen tot 10 jaar bewaard worden op een server van de Universiteit Twente.

Vrijwilligheid
Deelname van uw kind aan dit onderzoek is vrijwillig. Uw kind wordt voor het invullen van de vragenlijst zelf om akkoord gevraagd voor vrijwillige deelname. Naast de ouderlijke toestemming voor minderjarige kinderen (jonger dan 16), worden deze kinderen zelf ook gewezen op vrijwillige deelname en om toestemming gevraagd.

Contactinformatie en bezwaar indienen
Deze brief heeft tot doel om uw toestemming te vragen voor deelname van uw kind (jonger dan 16) aan dit onderzoek. Indien u bezwaar heeft tegen deelname van uw kind (jonger dan 16) aan de vragenlijst dan kunt u dit kenbaar maken aan naam + mailadres contactpersoon school. Indien u bezwaar aantekent verwachten wij tevens van u dat u dit door zult geven aan uw kind. De docent zal dan in de klas geen link tot de vragenlijst verstrekken aan uw kind. Indien u geen bezwaar aantekent tot deelname zien wij dit als akkoord gaan met deelname. Indien uw kind ouder is dan 16 jaar dan mag uw kind wettelijk gezien zelf kiezen of uw kind de vragenlijst wil invullen. Uw kind (ouder dan 16) zal in de klas standaard de link tot de vragenlijst ontvangen en kan hierbij zelf de keus maken om wel/niet deel te nemen.

Mocht u vragen hebben naar aanleiding van dit onderzoek of deze brief, dan kunt u contact opnemen met naam + mailadres contactpersoon school invullen. Dit onderzoeksproject is beoordeeld en goedgekeurd door de ethische commissie van de Faculteit van Behavioural, Management and Social Sciences van de Universiteit Twente. Bent u het ergens niet mee eens of heeft u zorgen over de onderzoeksprocedure? Dan kunt u mailen naar de ethische commissie van de Universiteit Twente via: ethicscommittee-bms@utwente.nl.

Met vriendelijke groet,
Tom van den Berg
Lisanne Schulenburg