

# [Vaccinations, children, 91.1% had at least one dose](https://assignbuster.com/vaccinations-children-911-had-at-least-one-dose/)

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Vaccinations, widely regarded by experts as one of the greatest achievements in public healthin the past century, have contributed greatly to reduced incidence andchildhood mortality from certain infectious diseases. 1, 2 Despitethese achievements, vaccinations are not without their detractors. Overallnational vaccination coverage remains high despite opposition to vaccinationprograms. 3 A 2013 report by the US Centers for Disease Control foundthat in children, 91. 1% had at least one dose of the measles, mumps, andrubella vaccine and 83.

1% had at least four doses of the diphtheria, tetanus, and acellular pertussis vaccine. 3 However, over the past 20 years, rates of non-medical exemptions that allow parents to refuse vaccinations onphilosophical or religious grounds have been steadily increasing. 4, 5A recent survey suggests that approximately 40% of parents delay or refuse vaccinationsfor their children. 6        Vaccinerefusal is associated with an increased risk of acquiring vaccine-preventable illness. 7.

One study investigating national measles outbreaks between 1985 and 1992, foundthat among unvaccinated individuals, those with vaccine exemptions were 35times more likely to contact measles compared to vaccinated children. 8A second study using data from Colorado from 1987 to 1998 found that childrenwith vaccine exemptions were 22 times more likely to contract measles comparedto vaccinated children. 9 A recent study investigatingvaccine-preventable disease occurrence in unvaccinated children found that of970 measles cases reported between 2000 and 2015 that included sufficientinformation about vaccine status, 574 cases occurred in unvaccinatedindividuals and of those cases, 70. 6% were intentionally unvaccinated due tonon-medical exemptions.

7 Individuals with the disease who receivednon-medical exemptions represented a total of 41. 8% of reported cases.  Similarly, higher exemption rates are associated with higher rates of pertussis in bothunvaccinated and vaccinated populations.

7 Among reported pertussiscases, 24-45% of individuals were unvaccinated with 59-93% of individualshaving been intentionally unvaccinated. 7 Among statewide pertussisoutbreak reports that contained sufficient information about the vaccinationstatus of individuals with the disease, 70% of unvaccinated pertussis cases ina 2012 outbreak in Oregon and 84% of cases in a 2013 outbreak in Florida wereamong children with vaccine exemptions. 10, 11 One case-control studyfound that among pertussis cases between 1996 and 2007, individuals withvaccine exemptions were 20 times more likely to contract pertussis. 12 However, despite the associations between vaccine refusal and an increased likelihood ofdisease acquisition, many parents choose to delay or refuse vaccination fortheir children. 13 Among parents who choose to delay or refusevaccination, there is an association with the use of complementary andalternative medicine (CAM), defined by the National Institutes of Health as agroup of diverse medical and health care systems, practices, and products thatare not presently considered to be part of conventional medicine and includeschiropractic medicine, Chinese medicine and acupuncture, massage, andnaturopathic medicine. 14 Parents who use CAM have been shown toexpress a greater concern about vaccine side effects and a higher likelihood ofrefusing vaccination for their children. 15 Parents who prefer CAMtherapies have been found to be more skeptical about the benefits ofvaccination and are more likely to believe misconceptions about vaccines. 15, 16Additionally, evidence suggests that use of CAM and vaccine skepticism are bothparts of a common attitudinal stance and set of psychosocial values.

17Among CAM providers, including chiropractors and naturopathic physicians, therehave been mixed findings on attitudes toward vaccination. The attitudes ofnaturopathic physicians in particular have not been well-studied but publishedreports suggest that the minority support full vaccination. 13 In onestudy of Massachusetts naturopathic physicians, researchers found that 20%recommended vaccination, 7% actively opposed vaccination, and the rest, a vastmajority, made no recommendation. 18 CAMusage among children is estimated to be lower than usage among adults. AmongWashington insurance claims in 2002, only 6% of children under age 17 had usedany form of CAM during the calendar year. 19 A 2010 study of CAMproviders, including chiropractors, acupuncturists, massage therapists, andnaturopathic physicians, in the state of Washington investigated practicesamong 11, 144 pediatric patients based on insurance records from twonon-Medicaid insurance companies.

13 In this study, fewer than 4% ofchildren had any visits with a CAM provider. Researchers investigated rates ofvaccination and incidence of ten vaccine-preventable illnesses based on federalpediatric vaccination guidelines. The results of the study suggest thatchildren seeing naturopathic physicians were more likely to be unvaccinated andthat the use of naturopathic medicine by pediatric patients was associated withan increased likelihood of a diagnosis of a vaccine-preventable illness (OR1. 67 95 percent CI 1.

31-2. 15). Despite these data, relationship causalitycannot be established as it is possible that parents who are alreadyvaccine-hesitant choose to seek out CAM providers for pediatric care. Whileuse of CAM has been associated with parental refusal of childhood vaccines andwith an increased risk of vaccine preventable diseases, attitudes and practicesregarding vaccination among providers and students of CAM are still poorlyunderstood. A 2004 study conducted at the Canadian College of NaturopathicMedicine in Toronto, Canada, assessed the attitudes of naturopathic medicinestudents regarding vaccination. 20 This study found that only 12.

8%of students would recommend full vaccination according to the recommendedschedule and 74. 4% of students would recommend partial vaccination. Researchersfound that willingness to advise full vaccination and overall trust in publichealth and conventional medicine decreased in later years of the program.

Aprevious version of the current survey, administered at National College ofNatural Medicine in Portland, Oregon, in 2013 found that 100% of naturopathicmedicine students would recommend an alternative vaccination schedule and thatthe majority of students would regularly or occasionally recommend vaccines intheir future practice. Thecurrent study aims to assess the attitudes, education, and sources ofinformation surrounding vaccination among students at three U. S.-basednaturopathic medicine programs.

METHODSThreenaturopathic medicine schools, National College of Natural Medicine (NCNM), Bastyr University, and University of Bridgeport, were chosen to participate inthe study. The naturopathic medicine programs at these schools require studentsto matriculate with a previous bachelor’s degree and coursework in basic lifesciences. Graduates of these programs complete academic coursework related tobasic sciences, pathology, clinical diagnosis, and laboratory diagnosis, aswell as botanical medicine, physical medicine, clinical nutrition, andpharmacology. In addition to their academic training, students completenumerous clinical rotations under the supervision of naturopathic physicians ina variety of primary care and adjunctive care settings. Naturopathic physiciansare currently licensed in 21 U.

S. states and territories. Researchersreceived approval from the institutional review boards of the threenaturopathic medical schools and Yale University to distribute a survey to allnaturopathic medicine students. The survey was developed in 2013 by a team ofresearchers using a variety of quantitative, scale, and open-ended responsequestions combining questions from previous surveys and expert opinions. Thesurvey was aimed at assessing 1) where students were educated aboutvaccinations in their medical programs, 2) what other resources students use toeducate themselves on vaccinations, 3) the perceived credibility of educationaland supplemental information sources, 4) attitudes about vaccination, and 5)intended future practices.

The 2015 survey was updated to include questionsrelated to the 2014-15 Disneyland measles outbreak and proposed laws mandatingvaccination.   The59 question survey was distributed to students using Qualtrics web-basedsoftware. Students received a link to complete the survey from the dean orassociate dean of naturopathic medicine at each college.

Students were giventhree weeks to complete the survey. It was estimated that the study would take20 to 30 minutes to complete. In order to incentive participation in the study, upon completing the survey, participants were able to enter their name andemail address to be entered in a drawing for an Apple Watch which would be awardedto one participant at the end of the study period.

Ofthe 59 questions in the survey, 20 questions were focused on assessing thestudents’ naturopathic medical education surrounding vaccines. In addition tobasic demographic information about program and year in school, questions inthis section included queries into which classes provided information aboutvaccinations. Students were also asked which sources of information they usedto supplement their classroom education on vaccines. Additionally, informationon perceived credibility of both naturopathic and conventional medicaleducation was assessed. The second section was comprised of 16 questionsrelated to opinions about vaccinations and their safety and effectiveness.

Thissection questioned students on their opinions about the safety andeffectiveness of vaccines as well as perceived and observed adverse effects ofvaccination. The third section was comprised of nine questions regarding publicperceptions about vaccines and current events involving vaccination, includingthe Disneyland measles outbreak. The final section of the survey included 15questions focused on students’ intended future practices regarding vaccination. This section included questions on whether or not participants intended torecommend vaccinations, how scope of practice would influence theirrecommendation, and whether they would use additional or alternative therapiesin conjunction with or instead of vaccination.  RESULTSAtotal of 242 students provided responses (20. 1%).

Of these respondents, 108were from Bastyr University, 103 were from NCNM, and 28 were from University ofBridgeport. Respondents represented all years of the naturopathic programs with52 first year students, 54 second year students, 52 third year students, and 81students from years four, five, and six providing responses.  Inresponse to the question, “ In which of your courses have you learned aboutvaccines?,” participants were asked to select all courses that applied from alist of six choices: immunology, microbiology, pediatrics, pharmacology, publichealth, or other class or elective. A total of 211 participants (87. 2%)provided responses to this question. Of these responses, 81% indicated theylearned about vaccines in immunology; 78% in microbiology; 43% in another classor elective; 40% in pediatrics; 30% in public health; and 30% in pharmacology(see Table 1). Inaddition to classroom education, students provided responses on additionalsources of information regarding vaccination. In response to the question, “ Doyou consult other sources of information to learn about vaccines in addition toyour standard classroom education?” students were asked to select all optionsthat applied from an extensive list of conventional, alternative, andvaccine-skeptical information sources.

A total of 224 participants providedresponses to this question (92. 6%). Of these responses, 72% of students indicatedthat they consulted the Centers for Disease Control Advisory Committee onVaccination Practices (CDC-ACIP); 55% consulted current peer-reviewedscientific literature; 54% consulted mentors or other clinicians; 34% consultedthe American Association of Naturopathic Physicians; 34% consulted alternativevaccine schedule sources such as Dr. Sears; and 32% consulted vaccine skepticalsources such as Mercola. com, Mothering.

com, or NaturalNews. com (see Table 2). Studentswere also asked to evaluate the credibility of these information sources.

Atotal of 152 students (62. 8%) provided responses to the question, “ Howtrustworthy do you think these various sources of information are?” Studentswere asked to score each source on a scale of untrustworthy, represented as avalue of zero, to very trustworthy, represented by a value of two. Moretrustworthy sources received values closer to two while sources perceived asless trustworthy received scores closer to zero (see table 3). Respondentsrated the American Association of Naturopathic Physicians as the most crediblesource with a score of 1. 26. Current peer-reviewed scientific literature andpersonal clinical experience were ranked as the second most credible sourceseach with scores of 1. 24. Conventional sources including the CDC-ACIP and theAmerican Academy of Pediatrics were rated as slightly less credible with scoresof 1.

16 and 1. 14, respectively. Alternative vaccine schedules such as Dr. Searswere rated as less credible with a score of 0. 96.

Vaccine skeptical sourcessuch as Mercola. com, Mothering. com, and NaturalNews. com were rated as the leastcredible sources of information with a score of 0. 33.  Atotal of 192 students (79%) provided responses to the question, “ Do you supportthe general concept of conventional vaccinations for the prevention ofinfectious diseases in children and adults?” Of these respondents, 77% answered” yes,” while 23% answered “ no” (see Table 4). In response to the question,” What is your general opinion of pediatric vaccine schedules?” students wereasked to select all options that applied (see Table 4).

Two-thirds (67%) ofstudents answered that children should be evaluated on an individual basis; 62%of students responded that children should be given some or all vaccinationsbut these should be administered at different ages and/or intervals than theschedule suggests; 35% of respondents answered that children should be givensome, but not all, scheduled vaccinations; 22% of respondents answered thatchildren should be vaccinated according to the CDC-ACIP vaccination schedule; and 7% of respondents indicated that children should be entirely vaccine free. Inresponse to the question, “ What do you believe are problems related tovaccination programs?” a total of 157 students provided responses (64. 9%). Students were asked to select all answers that applied (see Table 5). Of theseresponses, 84% of students indicated that preservatives or adjuvants were aproblem associated with vaccines; 83% of students responded that multiple vaccinesadministered simultaneously was a problem; 76% of students responded thatvaccines are given too early; 64% of respondents indicated that vaccine adverseevents were under-reported; 62% responded that there are too many vaccinesgiven overall; and 34% of respondents indicated that autism spectrum disordersbeing linked to vaccines was a problem.

Inresponse to questions about future practices, 80% of students responded thatthey would offer vaccinations in their clinics if insurance or state and federalprograms (such as the Vaccines for Children federal program) cover the costsfor naturopathic physicians to administer vaccinations. Additionally, 43% ofrespondents indicated that they would regularly prescribe or recommendvaccination to their patients; 30% would occasionally recommend; 14% wouldrarely recommend; and 12% would never recommend. A total of 73% of respondentswould recommend an alternative schedule for vaccinations based on patienthealth status (91%), to reduce the number of vaccines given simultaneously(87%), and based on their patient’s age (87%). To guide their decision makingin prescribing an alternative schedule, 78% of respondents indicated they woulduse current peer-reviewed scientific literature; 69% would consult the AmericanAssociation of Naturopathic Physicians; and 67% would consult other cliniciansor mentors (see Table 6).

DISCUSSIONTheresults of the current study can be compared to the 2013 pilot surveyadministered at NCNM to observe possible trends in education and informationregarding vaccines. The 2013 study had a similar total response rate to the2015 study but overall, fewer participants answered each question so thevalidity of any comparison between the two studies is limited. Still, it isimportant to note that there were several changes in the answers betweenresponses in 2013 and 2015. In the 2013 survey, 100% of respondents indicatedthat they would recommend an alternative vaccination schedule for theirpatients; in 2015, only 62% of students indicated that they would recommend analtered schedule and 22% of students responded that they would recommend thefull CDC-ACIP schedule for their patients.

Inthe 2013 study, 100% of respondents indicated that they use alternativevaccination schedules to supplement their classroom education on vaccines; thisnumber was 34% in 2015. In 2013, 54% of students indicated that they wouldconsult vaccine-skeptical sources such as Mercola. com, Mothering. com, NaturalNews. com, and others for information on vaccines; in 2015, less thanone-third of students (32%) indicated they would use these sources.  Reportedperceived credibility of various sources of information also changed between2013 and 2015. In both surveys, students were asked to rate sources on a scaleof not credible (0) to credible (2). Scores closer to two indicate highercredibility.

In 2013, students rated alternative vaccination sources as themost trustworthy source of information on vaccines with a score of 1. 21; in2015, alternative vaccination schedules scored 0. 96. The CDC-ACIP was scored at0. 96 in 2013 but increased to 1. 16, and ranked as the fourth most crediblesource, in 2015. Similarly, the American Academy of Pediatrics was scored at0. 79 in 2013 and increased to 1.

14 in 2015. Vaccine-skeptical sources werescored as the least credible sources in both surveys and decreased from a scoreof 0. 57 in 2013 to 0. 33 in 2015.

Responsesto questions about the perceived problems associated with vaccinations alsochanged between the two surveys. In 2013, nearly all participants (96%)indicated that preservatives and adjuvants were problematic; while still themost common response, in 2015, only 84% of participants indicated that this wasa problem. Vaccinations given too early was the second most common response in2013 with 92% of respondents indicating this was a problem; in 2015, only 76%of respondents chose this option. In 2013, almost half of respondents (46%)indicated that an association between autism and vaccines was a problem withvaccination; in 2015, only 34% of respondents chose this option. Whilethe sample size of each survey was too small to be representative, comparisonsof the results from the 2013 and 2015 surveys provide interesting points forfurther study. Based on the results of the two surveys, it appears that morestudents are consulting conventional sources of information on vaccines andthat they find these sources to be overall more credible than vaccine-skepticalsources.

The results also suggest that alternative vaccination schedules areused by fewer students in 2015 than in 2013 although the majority of studentsin both surveys indicated that they would advise an altered vaccinationschedule for pediatric patients. Theresults of the current study are also consistent with results of a 2004 studyconducted at the Canadian College of Naturopathic Medicine. 20 Whilethis survey and our study used different study tools with different questions, the results in the 2004 study suggest that 74. 4% of respondents would recommendpartial vaccination which is comparable to the 62% who would recommend the samein our study. Additionally, the data in our study are consistent with a studyof practicing naturopathic physicians in Massachusetts in which 20% ofrespondents would actively recommend vaccinations and 7% would openly opposethem; the results in the current study suggest that 22% of students support thefull CDC-ACIP vaccine schedule and 7% believe that children should be entirelyvaccine-free. 18  Ourresults offer an interesting comparison to vaccination attitudes studied inconventional allopathic medicine students. A recent study of students at theUniversity of Central Florida found that most students reported stronglypositive attitudes toward vaccination. 21 Despite their attitudes, only 29% of students reported receiving adequate education regarding vaccines intheir medical education.

Of particular interest to the comparison withnaturopathic students, 55% of respondents indicated that alternativevaccination schedules were an acceptable way to minimize parental stress. Thisis comparable to the 62% of naturopathic students in our study who indicatedthat they would vaccinate according to an alternative schedule. Thecurrent study has several limitations. First, the sample size, 242 students(20. 8%), is not large enough to be considered representative. Because thesurvey was administered at NCNM in 2013 and again in 2015, it is possible thatthe same students responded to both surveys or that completely differentstudents responded to each survey making comparisons between the results of thetwo surveys impossible to evaluate with any level of certainty.

Secondly, theentire sample population did not respond to each question in the survey leadingto the potential for non-responder bias. Finally, it is outside the scope ofthis study to determine a whether the attitudes regarding vaccination reportedby naturopathic medicine students are fostered by their naturopathic educationor whether they are previously held attitudes that remain unchanged despitetheir medical education. Evidence suggests that support of CAM and vaccineskepticism are components of a common set of attitudes and values so it ispossible that students of naturopathic medicine subscribe to a set of beliefsthat makes them more likely to pursue a career in CAM as well as maintainskepticism of vaccines and conventional medicine. 17 Theresults of the current study suggest that the majority of respondents supportthe general idea of vaccination but would advise pediatric patients to receivevaccinations on an altered schedule. The public health implications of thesedata are significant.

Recent research suggests a correlation between theattitude and personal practices healthcare providers and their knowledgeregarding vaccinations. 22 While naturopathic physicians representonly a small number of providers in the US medical system, they have thepotential influence many parents through CAM-affiliated websites andliterature. 23, 24 Engaging students and practitioners of naturopathicmedicine in productive dialogue regarding vaccination would provide benefit topublic health programs aimed at increasing vaccination rates in children whosee CAM providers.  CONCLUSIONEducationregarding vaccination among naturopathic medicine students comes from a varietyof sources. Students consult a number of conventional, alternative, andvaccine-skeptical sources to supplement their classroom education on vaccines.

These sources have varying levels of perceived credibility. The attitudesnaturopathic students hold regarding vaccination and their intended futurepractices may have considerable impacts in public health. Public healthofficials should promote dialogue with naturopathic students and providers inan effort to improve vaccine compliance.