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Autism and Vaccines:
Exploring Misperceptions in Science
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Abstract

This paper will be exploring the supposed link between vaccines and autism which is a hot button topic as of late. Starting at the roots of where this myth began with the infamous and long since disproved initial paper penned by Andrew Wakefield. As of late with the ever-rising numbers of parents deciding to forego the vaccination of their children there is an increasing risk of herd immunity failing leading to old diseases that had been wiped out making a massive resurgence. Detailed in my research findings will be data driven explorations of psychology and human nature changing perception of information and misinformation. There are some completely unsurprising findings in how misinformation propagates and lays down deep roots that are shockingly difficult to reduce in effectiveness. Risk perception has been skewed in the modern age playing on the local knowledge but in the internet age, the seemingly local celebrity driven being a large driver of misconceptions. Another difference explored is the divide between science and pseudoscience which also goes by the name of “boundary work”, and how the two are worlds apart in methods and approach.

Keywords: Autism and vaccines, reactions, perception, responses, autism spectrum disorder.

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The pandemic began in the spring and ran mostly unchecked for well over six months before it plateaued and finally was contained nearly 8 months later. It seemed like an ordinary Tuesday in April when the first cases of a new strain of measles appeared in an upper-class hipster neighborhood school. The first three cases were assumed to be isolated but within the week more than half of the student populace and some of the staff were infected. By the end of the month the isolated incident had spread beyond the immediate area and had been classed as a pandemic by the CDC prompting a quarantine lockdown. This terrifying scenario is thankfully fictitious but is scarily possible in communities where the parents of children in school decide to not vaccinate the children. Non-vaccinated children threaten herd immunity wherein contagious diseases are resisted through means of high proportion of a population being immune via means of inoculation or vaccination. Threatening this herd immunity is a relatively recent, yet patently wrong, train of thought that suggests that there exists a link between vaccination and autism which spread like wildfire.

Vaccines are possibly one of the most underappreciated inventions that was first fielded just over two and a half centuries ago, have their benefit of herd immunity coming into questionable standing with a new wave of people avoiding inoculation based on unfounded fears of autism as a side effect. After logging began in 2000 by the CDC a steady increase in rate of detection of autism has been observed from 1 in 150 to 1 in 68 children. A point of interest is that the infamous study (now retracted) that attempted to link autism and vaccination was published in 1998 by Andrew Wakefield which led to an immediate serious decrease in the rate

of vaccinations that was followed by a parallel increase in reporting of autism diagnosis instances.

Humans are creatures ruled by fear, and one of the worst kinds of fear is fear of the unknown. Autism is a severely complicated disorder that stretches across a spectrum and has a myriad of precursor causes, most of which are unknowns and as such cannot be minimized or even avoided, leading to the fear manifesting stronger. The basic picture is simple: Despite overwhelming scientific consensus that measles, mumps, and rubella (hereafter, MMR) vaccines do not cause autism (Shwed and Bearman 2010), many people believe otherwise. Cautious physicians confronted with widespread fear of vaccines may encourage parents to split immunization sequences, leading to multiple visits, therefore leading to repeated opportunities for reactions to occur, and long periods of susceptibility to childhood diseases, the eradication of which—in the Western world—was rightly hailed as the crowning achievement of public health policy of the last century (Bearman, 2007). Parents who are told that their child is autistic will grasp at straws in their desperation to discern a probable catalyst that would have led to the diagnosis. Unfortunately, almost as a rule, humans tend to not want to be blamed for results of their actions/inaction and will attempt to foist the blame onto external factors beyond their control in an attempt to make themselves feel better about themselves. In the frantic search for a simple explanation, most will resort to searching for a so called “single bullet” precursor, wherein a single factor led to the issue arising instead of a host of complicated factors both internal and external. The problem with this method is simply that there is no single bullet explanation for anything that occurs in the world due to the myriad of tiny changes that add up to make the larger changes.

Misinformation, once set in someone's memory, is far more robust than factual while being very difficult to correct once already out due to psychological quirks in the human mind and processing of input. Of all the kinds of information, misinformation spreads most like wildfire due to the ease of misrepresentation through means of an immediate attention-grabbing hook that then leads to a broader range integration into the minds of the people that take in the information. and holds far more persistence in a populace's collective memory than any corrections or follow on information that arises later. As Pluviano wrote in a 2017 paper "...people are susceptible to misinformation even though they had acknowledged that the information at hand is factually incorrect." With a specific example in the case of vaccines, providing evidence about the safety of immunization may not be enough as people may have heard or read somewhere that, for example, vaccines are not necessary, that they cause autism or contain dangerous chemicals.

Another explanation for the lingering effect of misinformation assumes that people build mental models of unfolding events. If a central piece of the model is invalidated, people are left with a gap in their knowledge of the event, whose representation simply does not make any sense unless one decides to maintain the false and invalidated information.

Thus, feeling uncomfortable with gaps in their understanding, people prefer a more readily available and complete model, albeit inaccurate, over a correct but incomplete one, sticking to the original idea and ignoring the retraction (Pluviano, 2017).

Intriguingly, across historical time series, vaccine coverage is relatively constant if a vaccine scare is not currently occurring. In both scares that happened in the UK, publication of alleged risks was followed by a predictable media firestorm across all platforms. This coverage continued for an additional 4-5 years to drop out with social learning causing non-vaccination

behavior to spread locally among parents as a possible source of the delayed decay time (Bauch, 2012). One reason for the tenacity of misinformation in a populace is the requirement for more mental effort to be expended in assessing the validity of information rather than the ease of just accepting anything that is spoon fed to them. In a paradoxical result of a 2017 paper, where negative attitude parents were less likely to vaccinate after exposure to corrective information, a possibility of the correction of the misinformation threatening the participant's sense of self is presented. Being exposed to scientific information that conflicts with their prior held beliefs could be perceiving it as a threat or as a personal attack on their self-worth. However as this involves a third party as the recipient of care, the self-affirmation approach has not been researched enough for the researchers in the study to make any recommendations (Reavis). To effectively combat the misinformation that exists and certainly will come, a precision targeted corrective strategy is the optimal approach to take. "Ideally, corrective strategies should be directed at the precise factors that may influence vaccination decision-making and impede vaccine uptake, which include, over and beyond strong attitudes against vaccines, social norms pushing individuals to conform to the majority's behavior, standards for vaccine uptake in a specific population, and structural barriers to vaccination such as potential financial costs of vaccines and their ease of access" (Pluviano, 2017).

Another facet of this issue is the divide between hard science and pseudoscience which is also known as "boundary work". A definition of boundary work is "attribution of selected characteristics to the institution of science (i.e., to its practitioners, methods, stock of knowledge, values and work organization) for purposes of constructing a social boundary that distinguishes some intellectual activities as 'non-science'. In other words, to keep the authority of institutional science, it is necessary to distinguish between what is and what is not science and to drive out

those who threaten the integrity of the institution. Now the caveat to this is that science is by no means monolithic. It is, of course, divided into numerous disciplines and sub-disciplines, with even more numerous specializations in between. Boundary work can occur even within science from when the disciplines interact (Scott, 2015). This brings to light the oft-forgotten fact that science is by no means the holder of the final answer or infallible, it is in a perpetual state of seeking to prove itself wrong and discover things through proving out those facts.

One of the issues with anti-vaccination advocates is that the human perception is incredibly subjective and is easily skewed by their peers and perceived authorities. This causes a difficulty in targeting campaigns to correct the misinformation to the affected populace. In an interesting study on risk perception released in 2004, respondents saw the diseases that are preventable through vaccination to be less serious than other parents(Woo). With most of the surveyed being 30 years old and reporting to the study at the turn of the century, it is safe to say that most of these people were too young to remember the polio years in the 40's and 50's where an estimated 35,000 people were disabled by the viral disease before being declared eradicated by the CDC in 1979 thanks to vaccines(CDC). Unsurprisingly, approximately a fifth of the reporters in the study said that a web site established the mental link between their child's symptoms might be related and that others had researched autism and related disorders online and that due to extensive media coverage would say the association is likely (Woo, 2004). Exposing parents to scientific evidence that refutes a link between vaccines and autism decreased belief that vaccines were unsafe but paradoxically also decreased intention to vaccinate, particularly among those who had negative views in the first place (Reavis, 2017). The findings demonstrate a marked link between media influencing parental perception of vaccine safety and underpins the dire need to better communicate scientific information on vaccine safety and

benefits to everyone (Woo, 2004). Science outreach and communication is one of the things that has been shifted with a far larger focus in the last decade and is only forecasted to get more funding and drive behind it. It is hoped that the selfish approach of not vaccinating children will die out and with a new appreciation and understanding of science lighting the way to a bright future for everyone.

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