ENHANCING CHARACTERIZATION OF THE DECISION-MAKING ARCHITECTURE OF PARENTS RESPONSIBLE FOR THE VACCINATION STATUS OF THEIR SCHOOL-AGED CHILDREN: EXPLORING THE EPIDEMIOLOGICAL UTILITY OF ASSESSING HEALTHISM, TRUST, AND SOCIAL IDENTITY IN NORTHERN LOWER MICHIGAN

By

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ABSTRACT

ENHANCING CHARACTERIZATION OF THE DECISION-MAKING ARCHITECTURE OF PARENTS RESPONSIBLE FOR THE VACCINATION STATUS OF THEIR SCHOOL-AGED CHILDREN: EXPLORING THE EPIDEMIOLOGICAL UTILITY OF ASSESSING HEALTHISM, TRUST, AND SOCIAL IDENTITY IN NORTHERN LOWER MICHIGAN

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Decision-making characteristics of heterogeneous subgroups of parents have been defined by parental levels of trust in medical authorities and healthism (or heath agency) expressed in medical encounters. Integrating social identity constructs into this framework can clarify how vaccination-related inconvenience can nudge parents with low healthism/low trust decision-making orientations (for simplicity's sake, these parents are labeled here as "agnostics") toward vaccination; how conventional (vaccine) waiver education can provoke social identity threat in parents with high healthism/low trust decision-making orientations (more simply labeled here as "activists"); and how new interventions can be developed to reduce bias and increase trust between activist parents who file waivers for their school-aged children and public health professionals. This study investigated 3 primary hypotheses: 1) A mini assessment based on healthism/trust measures could accurately classify activist and agnostic parents; 2) Activist parents, compared to agnostic parents, excel at promoting healthier non-vaccination related behaviors in their school-aged children; and 3) Activist parents, compared to agnostic parents, exhibit greater sensitivity to the role of social encouragement and support, but less sensitivity to vaccination-related inconvenience. This study employed a cross-sectional design. Parents were recruited from two health departments in northern lower Michigan with elevated waiver rates, and the final study sample was comprised of 26 parents who fully vaccinated their child

entering 7th grade and 25 parents who filed waivers for their child entering 7th grade. Parents completed survey questions about healthy behaviors and the role of trust, healthism, inconvenience, and social encouragement/support in their vaccination-related decision making. In unadjusted analyses, activist parents, compared to the fully vaccinating parents, exhibited significantly higher mean healthy behavior scores (65.17 v. 62.54; p-value = 0.101) and higher mean scores on a sub-scale that indicated higher physical activity (16.68 v. 15.42; p-value = 0.07). However, in adjusted analyses, these associations disappeared; male parents remained significantly associated with lower healthy behavior scores (p-value = 0.0084) and lower physical activity sub-scores (p-value = 0.0510). In adjusted and unadjusted analyses, the fully vaccinating parents, compared to the activist parents, exhibited significantly higher mean scores on several inconvenience sensitivity measures and on the social encouragement sensitivity measure (which is a surprise finding). To reduce bias and increase trust between activist parents and waiver educators in Michigan, consideration should be given to better aligning mandatory waiver education with social identity theory, which can be accomplished by more systematically inducing a common ingroup identity based on "playing on the same team." In addition, to avoid inadvertently provoking stereotype threat for female activist parents and to improve intergroup relations, waiver educators could adopt a new messaging strategy that affirms the unique subgroup identity of female activist parents, which can be accomplished by emphasizing that female activist and female fully-vaccinating parents, compared to their male counterparts, appear to excel at promoting non vaccination-related health behaviors in their school-aged children.

For Keri, Kenny, Mr. Biggs, Bowie, and Molly

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The anti-vax movement "deeply concerns me, and puzzles me," Collins said. I think anybody who knows the history of how illnesses for which we have vaccines have killed so many people, including many, many children – you just wonder: how could we take one of the greatest advances of human biomedical research and decide that I don't want to use that on my child?"
-Francis Collins, Director, National Institute of Health (As quoted by Adriana Belmonte, Yahoo Finance, 9 February 2020) [1]

Recently, there has been a focus on the use of psychological science in developing, implementing, and evaluating interventions to improve vaccination uptake… These principles can be broadly applied to understand the implementation of state laws for school-entry [vaccine] mandates, and develop more in-depth evaluation frameworks for assessing the use and modification of these of mandates.
-Bednarczyk et al., 2019 [2]

[Author's Note: The comments by Francis Collins illustrate the current strength of anti-vaccination convictions held by a small but vocal group of parents, despite decades-long efforts to correct them, and the excerpt by Bednarczyk et al. suggests that a *psychological turn* is necessary in order to more effectively understand and counter these otherwise seemingly unfalsifiable beliefs.]

Chapter 1: Compulsory School-Age Immunization V. Non-Medical Exemptions with Mandatory (In-Person) Education – The Need for a New Approach Addressing the Social Identity Needs of Heterogeneous Parent Subgroups

National median coverage rates for vaccines required for school-entry in the United States are typically high for children in kindergarten. For example, the national median coverage rate in the 2017-18 school year for MMR (measles, mumps, and rubella), 2 doses, was 94.3% and for DTaP (diphtheria, tetanus, and pertussis), dose state-determined, was 95.1% [3]. The median national coverage rate for measles in the 2018-19 school year ticked up slightly to 94.7%, while the median national coverage rate for DTaP ticked down slightly to 94.9% [4]. In addition, national median non-medical exemption (NME) rates (for ≥ 1 vaccine) for kindergartners were relatively low for both years: 2.2% in 2017-18; 2.5% in 2018-19 [3][4]. However, these relatively low national median NME rates can mask greater NME variation and higher NME rates that can occur at the state and county level (and even at the individual

school-building level) and that can compromise herd immunity. For example, in the 2017-18 school-year, at the state level, in California, Mississippi, and West Virginia (which prohibited personal belief exemptions at the time), the NME rate was zero or near zero (less than 5 NMEs in California), while the NME rate in Oregon was 7.5% (the highest in the nation) [3]. At the county level, in a study of 18 states permitting NMEs, Olive et al. identified Camas, Idaho as the county with the highest NME rate of 26.67% for kindergartners in the 2016-17 school year [5]. At the county level in Michigan (in two counties where this study was conducted), the percent of waived kindergartners on September 30, 2019 was 13% in Leelanau County (northern lower Michigan) and 9.4% in Grand Traverse County (also in northern lower Michigan) [6][7]. Since children with NMEs, compared to fully vaccinated children, have been reported to exhibit significantly higher risks or greater odds of contracting pertussis (after accounting for the waning immunity of the pertussis vaccine) and measles across multiple time periods and study designs, according to a 2016 systematic review by Padke et al., NMEs represent a formidable, yet preventable public health threat to school-aged children [8].

In the mid-2010s, individual states began experimenting with legislative and administrative control measures to reduce NME rates against the following backdrop:

1. The national trend in rising NME rates from 1991 to 2011 [9][10],
2. Publicized local and multi-state measles and pertussis outbreaks in 2014 and 2015 [11][12],
3. The absence of evidence-based interventions, including novel approaches untried in the United States (such as tax and insurance incentives, and the linkage of school vouchers

for private school attendance to vaccination compliance), to counter parental decisions to intentionally delay and/or refuse vaccination for their school-age children [13][14]. Michigan is representative of several states during this period that sought to modify NME filing procedures either through legislative or administrative action [2], but Michigan is unique in exclusively requiring exempting parents to first attend an educational session at their LHD in person [15]. In response to the 2015 measles outbreak that originated at Disneyland (California) and ultimately resulted in 125 measles cases (as of 11 February 2015) spanning several states [16], the state of California eliminated NMEs through legislative action. By doing so, California joined West Virginia and Mississippi as the only three states that prohibit NMEs [2]. However, these two primary experimental approaches of eliminating NMEs and modifying NME filing procedures entail important ethical and public health trade-offs with potential unintended consequences that are generalizable to other states. For example, the unique Michigan requirement of mandatory in-person attendance at an educational session may inadvertently provoke a type of counterproductive identity threat in exempting parents, but it may also provide a unique opportunity to strengthen the relationship between these parents and public health professionals.

Prior to discussing general and specific tradeoffs inherent in vaccination-related policy, it is important to note that the legal basis for state authority to require immunization for school-entry has been affirmed by major Supreme Court decisions in the early 20th century [17][18], and contemporary ethics scholars have argued that ample moral justification exists for compulsory vaccination to safeguard against severe disease and disease transmission [19][20]. In addition, success of school-entry immunization in reducing the health and economic burden

of vaccine-preventable diseases (VPDs) is uncontested and lauded as one of the greatest accomplishments in modern public health [21]. However, despite the strong legal, moral, and public health foundations supporting compulsory vaccination, an ethical controversy continues to swirl around the question of allowing nonmedical vaccination exemptions (NMEs), also known as personal belief exemptions, to school-entry immunization requirements [22], which are codified into law in the United States at the state level. This ethical dilemma is typically characterized by the tension arising between the individual freedom (or autonomy) of parents who object to mandatory school-entry vaccination on religious or philosophical grounds and the state interest in protecting herd immunity to guard against VPDs entering or circulating within communities, especially in counties, school districts, and individual schools with higher rates of NMEs [23]. States (and other jurisdictions outside the United States) seek to reduce NME rates to protect children who may be too young to vaccinate, medically constrained from receiving vaccination, or unable to mount an optimal immune response to vaccination [23][24]. In addition, despite their staunch support for increasing vaccination rates for school-aged children, Opel et al. have raised questions about the potential of other unintended public health and ethical consequences of eliminating NMEs, including largely unconsidered issues related to post-elimination impacts on enforcement, vaccine confidence levels, and the currently accepted practice of targeting VPDs in school-settings (despite variance in disease-specific transmission in school settings) [18].

In contrast to California's NME elimination strategy, in 2015 the state of Michigan – on the heels of Michigan ranking among the top 5 states with highest NME rates for kindergartners in the 2013-2014 and 2014-2015 school years [25][26] and experiencing noteworthy measles

and pertussis outbreaks in 2014 [12][27] – implemented an administrative rule change that required parents to complete a standardized form and attend an educational session at a local health department prior to obtaining a NME [28]. Michigan's approach provides parents seeking NMEs for their children with information related to VPD risk and vaccine safety/risk, while simultaneously increasing the level of inconvenience experienced by parents seeking a NME. Subsequent reduction in the Michigan NME rate for kindergartners from 5.0% [26] in the school year prior to full implementation of the administrative rule change to 3.4% [29] in the full school year following the rule change is consistent with multiple studies finding a negative association between NME rates and complexity of NME filing procedures [10][30][31]. While the Michigan strategy appears to challenge attitudes and beliefs of vaccine exempting parents with educational materials and the behavior of vaccine hesitant but accepting parents with the disincentive of a more inconvenient NME filing procedure, it ultimately preserves the availability of NMEs. By doing so, the Michigan strategy arguably maintains an ethical balance between the freedom or autonomy of parents who conscientiously object to vaccination and the interest of the state in protecting herd immunity. It is also a practical public health approach in states like Michigan where the political environment makes consideration of NME elimination impossible.

However, the Michigan strategy appears to have come with its own public health trade-offs. Following implementation of the administrative rule change, the reduced statewide NME rate for kindergartners has remained high: 3.4% for the 2015-2016 school year and 3.5% for the 2016-2017 school year [29][32]. NME rates in 2019 are considerably higher in numerous clusters of Michigan counties, including counties in the northern lower peninsula of Michigan

clustered around Traverse City. In addition, public health practitioners in these northern Michigan counties anecdotally report that although a small proportion of parents who attended the mandatory educational session in the immediate aftermath of the MDHHS rule change elected to fully vaccinate their children, the overwhelming majority of parents (greater than 95%) attending educational sessions in 2019 go on to file NMEs for their school-age children. It appears that introduction of more complex NME filing procedures has inadvertently created a new public health dilemma in Michigan: a subgroup of parents appears to be reacting to the potential inconvenience of more complex NME filing procedures by vaccinating their children in compliance with school-entry immunization requirements, while another subgroup of vaccine-delaying and/or refusing parents appears to be resisting LHD education and filing NMEs out of strongly-held beliefs. Ironically, exempting parents, theoretically the strongest potential beneficiaries of LHD education, complain that the education is unnecessary and that mandatory attendance as a precondition for filing NMEs tramples their rights (potentially further alienating these parents) [15]. In addition, LHD staff face burn-out over the long haul by offering education that is not desired [15]. Furthermore, the high cost associated with offering ineffectual education wastes valuable public health resources [15].

The ethical dilemma in the Michigan strategy centers on the full impact of convenience/increasing inconvenience on the decision-making process of parents responsible for the vaccination-related status of their school-age children. On the one hand, evidence suggests that increasing complexity of NME filing procedures reduces NMEs rates in Michigan. On the other hand, Constable et al. have raised two related questions about the ethical implications of modifying NME filing procedures:

1. Should the assumption that increasing the complexity of filing NME procedures is tantamount to a "sincerity of belief" test be accepted without evidence to support it?
2. If so, does modifying NME filing procedures to add complexity amount to a dubious "heresy" test [14]?

In addition, Constable et al. express concern that adding complexity to NME filing likely selects out only parents that are adept at navigating bureaucratic processes [14], which presumably can leave out a subset of parents with sincerely held objections to school-entry immunization requirements. Blank et al. and other researchers typically steer clear of these ethical issues by simply (and convincingly) arguing that the process of filing NMEs should not be easier for parents than the process of (actually) obtaining vaccination for their school-age children. The intent here is not to enliven the ethical debate, but to note that this persuasive, fairness-based appeal for the merits of modifying NME filing procedures to reduce NME rates can inadvertently gloss over deeper, potentially informative questions. That is, where does the impact of convenience, and that of conviction (or sincerely held beliefs), begin and end for parents when making vaccination-related decisions for their school-age children? The role of inconvenience is typically not directly measured in surveys of vaccine hesitancy and acceptance (see [33] for an example of typical domains of inquiry), and when measured, the role of inconvenience is not comparatively assessed between parents accepting and refusing vaccination [34]. In addition, a recent survey instrument proposed by Sarathchandra, Navin, Largent, and McCright (2018) to assess vaccine hesitancy appears not to measure the role of inconvenience [35], despite an earlier 2017 recommendation by Navin and Largent that endorsed Michigan's strategy of increasing the burden or complexity of its NME filing

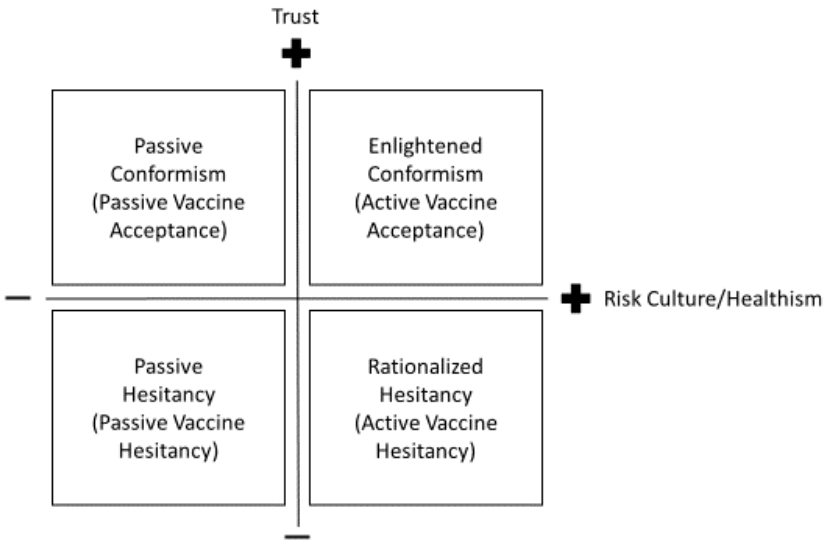
procedures over California's strategy to eliminate NMEs and Vermont's strategy to prioritize religious exemptions [28]. With the role of inconvenience remaining largely unmeasured or comparatively unassessed as a quantitative variable, it is currently not possible to fully understand:

1. How inconvenience can function as a disincentive to reduce NME rates,
2. How inconvenience may differentially affect heterogeneous subgroups of parents who delay/or refuse vaccination for their school-aged children due to different motivations.

A New Approach: Healthism and Social Identity

Without a more complete understanding of the roles that convenience and conviction play in the vaccination-related decision making of parents responsible for the vaccination status of their school-age children, it is difficult to imagine an alternative practical approach to NME reduction not requiring at least some of the ethical and public health compromises described above. Peretti-Watel et al. provide a novel perspective on the decision-making process of parents seeking NMEs for their school-age children that recasts the inconvenience/conviction question in terms of a concept in the sociological literature of vaccine hesitancy known as "risk culture/healthism" and a more conventional concept in the epidemiological literature of vaccine hesitancy typically described as trust in medical authorities (or the medical establishment) [36]. To fully explain this parental decision-making process, Peretti-Watel et al. hypothesize interaction between parental healthism and parental trust in medical authorities, illustrated in a two-dimensional, four-quadrant graphic (Figure 1).

Figure 1: Vaccine Hesitancy (and Acceptance) Theoretical Framework



*Graphic Reconstructed from Peretti-Watel et al.
Parenthetical Descriptors Added by Author

In the above figure, Peretti-Watel et al. break down the decision-making process that parents undergo when making vaccination-related decisions for their school-age children into two key components:

1. Trust in medical authorities (from lower to greater intensity), and
2. Strength of belief (conviction) in health advocacy (healthism) for their children (from lower to greater intensity).

According to Peretti-Watel et al., healthism is a major over-arching socio-cultural force, deeply rooted in the 20th century, which transforms the conventional relationship between lay people and medical authorities. Central to this conceptualization is the idea that parents as health-care entrepreneurs (or consumers) view themselves, rather than conventional medical authorities, as the primary agents in charge of managing their own health behaviors (with the

aim of achieving an optimized healthy lifestyle), and by extension, see themselves (not conventional medical authorities) as the most appropriate managers of their children's health-related life-styles [36]. In this conceptualization, parents actively engage in health-promoting activities relating to their children, including health-related research, intervention, and monitoring. In other words, parents high on the healthism scale actively embrace the responsibility of assuming the primary health promotion role for their children, seek health and health-related knowledge from all available sources, and challenge conventional medical wisdom when they deem necessary. Parents high on the healthism scale can fall into two categories, according to Peretti-Watel et al. For simplicity's sake here, these parents can be thought of and re-labeled either as "investigators" or as "activists." Investigators first do their own vaccine-related homework and then elect to fully vaccinate their school-aged children. In contrast, activists ultimately reject the status quo and elect to delay and/or refuse vaccination for their school-aged children based on of their own vaccine-related research.

On the other hand, parents low on the healthism scale display a more passive approach to managing the healthy life-styles of their children. Parents low on the healthism scale can also fall into two categories, according to Peretti-Watel et al. These parents can be thought of and re-labeled more simply here as "agnostics" or as "conformists." Agnostics correspond to the parents characterized by Peretti-Watel et al. (through referencing the work of Valen et al.) as the "I did not think about it [vaccination]" or "I somehow did not manage to do it [vaccination]" group [36]. In contrast, conformists follow a path-of-least-resistance mindset leading them to unquestioningly accept the vaccination-related recommendations for their school-aged children provided by conventional medical/health authorities. In other words,

parents low on the healthism scale may not actively consider the option of making choices that can differ from or comply with the recommendations made by conventional medical/health authorities.

Peretti-Watel et al.'s conceptualization of vaccine hesitancy in parents of school-aged children as an interaction between levels of healthism and levels of trust in medical authorities opens a new window into parental vaccine hesitancy research by raising several possibilities:

1. Investigators and activists may share previously unobserved decision-making characteristics (that is, similar high scores on the healthism scale) in community settings;
2. Conformists and agnostics may share previously unobserved decision-making characteristics (that is, similar low scoring scores on the healthism scale) in community settings;
3. "Active" parent groups (investigators and activists) and "passive" parent groups (conformists and agnostics) may exhibit different previously unobserved decision-making characteristics (that is, high versus low scores on the healthism scale) in community settings.

While all the above similarities and differences in the decision-making characteristics of parent subgroups are intriguing and warrant further investigation, consideration of the difference in these characteristics between parents classified as agnostics and parents classified as activists is of special public heath importance, as these parent subgroups intrinsically are at greatest risk of delaying and/or refusing vaccination for their school-aged children. That is, agnostic parents may do nothing until successfully prompted to vaccinate their school-aged children, while

activists may resist or protest conventional vaccine recommendations by intentionally delaying and/or refusing vaccination for their school-aged children. Theoretically, it is possible to assess the hypothesized differences in vaccination-related decision making characteristics between activists and agnostics by:

1. Measuring and comparing these two parent subgroups groups on the healthism scale;
2. Measuring and comparing intermediate health outcomes and behaviors, including BMI, fruit and vegetable consumption, sugary beverage consumption, screen usage, and physical activity, in their children.

Gilkey et al. report a significant association between "healthy [child] feeding practice" and forgone vaccination (vaccine refusal or delay), which suggests an important health advocacy role for parents [37], but without additionally assessing levels of healthism more directly to categorize parents into "active" and "passive" groups, it is not possible to compare child feeding practices across activist and agnostic parent subgroups. To fill this gap, it is necessary to simultaneously measure healthism for all parents and the non vaccination-related health behaviors of their immediate families and school-aged children. Effective application of the healthism and trust paradigm in this fashion can advance understanding of the vaccination-related decision-making architecture of parents responsible for the vaccination status of their school-aged children (assuming that trust is also assessed), but further illumination of this decision-making architecture – including its connection to effective interventions – requires an interdisciplinary approach.

Integrating social identity theory-related constructs, along with social categorization and social identity threat related constructs, into the healthism and trust paradigm advanced by

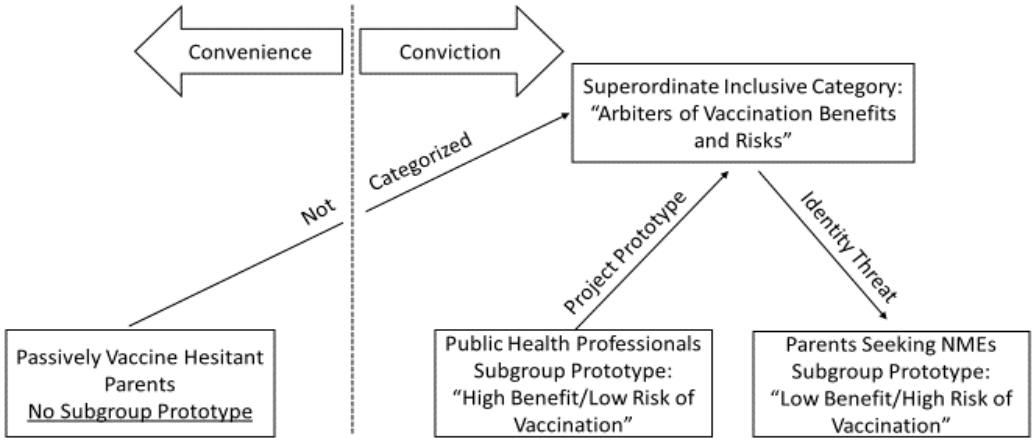
Peretti-Watel et al. can further refine characterization of agnostic and activist parents and can also enable comparative assessment of the social identity related needs of these two parent subgroups. In addition, assessing differences in social identity related needs can further clarify the roles that convenience and conviction play in the vaccination-related decision making of parents in each subgroup, potentially explaining:

- Why adding complexity (i.e., inconvenience) to NME filing procedures can nudge agnostic parents who are unaffiliated with a strong vaccination-related subgroup identity (based on the absence of a strong vaccination-related prototype) to take action and seek vaccination for their school-age children in the absence of social pressure from other parents;
- Why requiring mandatory attendance at a waiver education session at a local health department as a condition for obtaining NMEs can inadvertently provoke activist parents who are affiliated with a strong vaccination-related subgroup identity (based on a strong high-risk/low-benefit vaccination-related prototype) to experience social identity threat that triggers intensification of their anti-vaccination beliefs/convictions as a defense mechanism to protect social identity.

Consistent with social identity threat and its corollaries [38][39][40][41][42][43], public health professionals and activist parents seeking to file NMEs for their school-aged children self-identify with competing or conflicting social subgroups. More specifically, activist parents self-identify with a uniquely defined subgroup, theoretically characterized by the prototypical representation, “Low Benefit/High Risk of Vaccination” (Figure 2). In contrast, public health professionals self-identify with their own uniquely defined subgroup, theoretically

characterized by the proto-typical representation, “High Benefit/Low Risk of Vaccination” (Figure 2). According to social identity theory, activist parents and public health professionals then compete in the health encounter (or the public sphere) to establish the dominance of their unique subgroup prototype in the shared (inclusive) superordinate identity category, theoretically characterized by the prototypical representation, “Arbiters of Vaccination Benefits and Risk” (Figure 2).

Figure 2: Social Identity Processes and Parental Vaccine Hesitancy



Continuing to follow the core principles of social identity theory, social categorization theory, and the notion of social identity threat, the public health professional subgroup, representing the dominant in-group, theoretically can project the subgroup’s unique prototype, “High Benefit/Low Risk of Vaccination,” onto the shared superordinate identity category and then utilize this projected prototype as a basis for evaluating the validity of subgroup identity. This evaluation can theoretically provoke identity threat in the parent subgroup (with the “Low

Benefit/High Risk of Vaccination prototype) since they are perceived as representing the out-group (Figure 2). Nyhan et al. report evidence from a randomized control trial that health messaging designed to correct the MMR-autism link decreased intention to vaccinate among parents most strongly opposed to vaccination [44], and Reavis et al. directly linked this evidence of a counterproductive effect associated with corrective vaccination-related health messaging to identity threat [45]. In addition, Navin asserts that female vaccine deniers experience a unique kind of social identity threat based on their gender; when women respond defensively to biased communications in the medical encounter rooted in the stereotype that women lack the scientific competency to make evidence-based vaccination-related decisions for their school-aged children, that potentially intensifies their vaccine denialism by driving them away from mainstream pediatricians [46].

Members of the parent out-group experiencing social identity threat based on a vaccine-opposed prototype theoretically would be expected to rely on intragroup solidarity to protect the positive distinctiveness of their subgroup (see Horney and Hogg for explanation that "[p]erceived threat accentuates subgroup solidarity"…[39], p. 145), while members of the unaffiliated parent group (with no representative subgroup prototype) (Figure 2) would not be expected to rely on the social encouragement or support from similarly unaffiliated parents when considering (or not considering) vaccination-related decisions involving their school-aged children. In other words, activist parents facing social identity threat in the health encounter, or in the public sphere, are likely to close ranks with other parents self-identifying with a high risk/low benefit prototypical representation of vaccination (that is, with other activist parents). In contrast, other subgroup-unaffiliated parents (that is, agnostic parents) whose identity is not

connected to membership in a social group defined by a vaccination-related prototype) facing an absence of social pressure to make vaccination-related decisions are likely to remain "on the fence" until they are forced to make a decision in the face of potential inconvenience associated with attending a mandatory educational session at their local health department.

Enhanced characterization accounting for the social identity needs (or lack thereof) of agnostic and activist parents hypothetically can provide evidence for:

1. Continuance of the policy of more complex NME filing procedures requiring mandatory attendance at a waiver education session, at a local health department, prior to obtaining NMEs to motivate agnostic parents to vaccinate their school-aged children, and
2. Discontinuance of an educational approach that inadvertently triggers social identity threat and does not result in increased vaccination and replacement with an alternative educational approach more aligned with the social identity needs of activist parents seeking to file NMEs for their school-aged children.

That is, it is theoretically possible to assess differences in amenability to policy level interventions between agnostic and activist parents by measuring and comparing these two parent subgroups based on their sensitivity to approaches that add complexity to NME filing procedures or otherwise modify convenience levels associated with vaccine-delay and/or refusal (e.g., school expulsion policies for unvaccinated children in emergency outbreak situations). For example, Opel et al. recommend utilizing the question, "The only reason I have my child get shots is so they can enter daycare or school" [47], to assess potential impacts of school-entry immunization requirements. Convenience-focused questions can be appropriately

deployed to assess hypothesized differences between parent subgroup sensitivity to policy level interventions designed to reduce vaccine delay and/or refusal in parents responsible for the vaccination status of their school-age children. Likewise, it is theoretically possible to assess differences in the social identity-related needs of parents in both subgroups when they are asked to consider vaccination generally or changes in vaccination behavior more specifically for their school-aged children. For example, when asked to consider the role of social encouragement while considering their child's shots or when asked to consider the role of social support in potential changes of opinion about their child's shots, parents affiliated with a subgroup identity pinned to a vaccination-related prototype (e.g., parents seeking to file NMEs for their school-aged children) would be expected to exhibit greater agreement with the importance of social encouragement and support, compared to parents unaffiliated with a subgroup identity and vaccination-related prototype (e.g., parents hesitating about but ultimately accepting vaccination).

Study Organization

This study consists of 3 major sections. Section 1, comprised of Chapters 2 and 3, takes the form of a selective review, with the research objective of appropriately selecting, importing, and translating healthism constructs from the sociological literature and social identity-related constructs from the social psychology literature into the context of an epidemiological study focused on the decision-making process of parents responsible for the vaccination-related status of their school-age children. Chapter 2 clarifies the critical distinction between skepticism of the centrality of conventional medical/health authorities, or the desire for greater agency, in the medical or health encounter (as a healthism-related construct) and distrust of

conventional medical/health authorities to make the case that healthism and trust can be assessed as relatively independent constructs in epidemiological studies. Chapter 3 mines social identity-based theories of intergroup relations to make the case that bias can be reduced and trust enhanced between (vaccine) exempting parents committed to a low-benefit/high-risk vaccination-related subgroup-defining prototype and conventional medical/health authority groups committed to a high-benefit/low-risk vaccination-related subgroup-defining prototype through inducement of a new shared superordinate identity with nested subgroup identities.

Section 2, comprised of Chapters 4 and 5, describes the methodology and results of a field study carried out to test a series of hypotheses designed to assess whether healthism, trust, and social identity-related constructs can be simultaneously utilized in an epidemiological study to further enhance characterization of heterogenous parent subgroups responsible for the vaccination-related status of their school-aged children and to potentially explain why parents who eventually fully vaccinate their school-aged children appear receptive to convenience-related nudges, while the same approach appears to provoke social identity threat in activist parents that subsequently results in the counterproductive intensification of their vaccine delay and/or opposition. Chapter 4 describes this field study's methodology, including the major study assumption that parents who:

1. Wait until the end of July or later prior to the start of the school year to fully vaccinate their child entering 7th grade are prompted to do so by the motivation to avoid the inconvenience associated with mandatory attendance at a waiver education session at their LHD and therefore are accurately classified by their actual vaccination-related behavior as agnostics, and

2. Elect to file NMEs for their child entering 7th grade during the same time period are resistant to the influence of inconvenience due to their strongly held anti-vaccination convictions and therefore are accurately classified by their actual vaccination-related behavior as activists.

In addition, chapter 4 describes this study's three primary hypotheses that: 1. A diagnostic test measuring the decision-making characteristics of healthism and trust can reliably predict the vaccination-related behaviors of agnostic and activist parents, 2. Activist parents, compared to agnostics, excel at establishing healthier non vaccination-related family environments and in promoting healthier non vaccination-related individual behaviors for their child entering 7th grade, and 3. Agnostic parents are more responsive to the influence of convenience-based nudges than activists when making vaccination-related decisions for their school-aged children, while activist parents are more responsive to the role of social encouragement and support than agnostics when making vaccination-related decisions for their school-aged children. This field study utilizes a cross-sectional design, and the study sample consists of 25 (activist) parents who utilized LHD services to file NMEs, and 26 (agnostic) parents who utilized LHD service to fully vaccination their child entering 7th grade. The primary explanatory variable in this field study is parent group membership (activist v. agnostic), and the primary outcome variables include healthism, trust, inconvenience, social encouragement, and social support assessments. For the statistical analyses, sensitivity and specificity analyses are utilized to assess the reliability of the diagnostic test, and t-tests and linear regression analyses are conducted to assess the hypothesized differences in the outcome measures between parent groups. Chapter 5 summarizes the results of the field study. The results appear to:

1. Refute the part of this study's main assumption that parents who utilize LHD services at the end of July or later to fully vaccinate their school-aged children are accurately classified by their behavior as agnostics. [Author's note: the more general term "fully vaccinating" parents will be employed for the remainder of this introductory chapter and beginning again in Chapter 5 to refer to the parents who utilize LHD services to vaccinate their school-aged children, as this more broadly-defined parent group can be conceptualized as comprising a mixture of agnostic, conformist, and investigator parents, with an unknown proportion of each subgroup;
2. Marginally support the part of this study's main assumption that parents who utilize LHD services during the same period to file NMEs for their school-aged children are accurately classified by their behavior as activists;
3. Raise doubts about the reliability of a diagnostic test based on the primary healthism and trust measures to predict the vaccination-related behaviors of parents responsible for the vaccination-status of their school-aged children;
4. Provide preliminary evidence that female activist parents and female fully vaccinating parents, compared to male activist parents and male fully vaccinating parents, excel at promoting generally healthier family environments in non vaccination-related domains (nutrition and physical activity) for their school-aged children and healthier individual nutrition and physical activity-related behaviors in their school-aged children;
5. Provide preliminary evidence that fully vaccinating parents are significantly more receptive to convenience-based nudges than activist parents when making vaccination-related decisions for their school-aged children; and

6. Provide preliminary evidence that fully vaccinating parents, and not activist parents – as originally hypothesized – are significantly more receptive to the role of social encouragement when making vaccination-related decisions for their school-aged children.

Section 3, comprised of Chapters 6 and 7, discusses the methodological shortcomings of this study from an epidemiological perspective, post-hoc epidemiological analyses that can improve the methodological quality of the present study, and methodological improvements that can be utilized in the future to improve epidemiological assessment of theoretical frameworks that integrate healthism, social identity, and trust constructs to increase understanding of the decision-making architecture employed by parents responsible for the vaccination status of their school-aged children. More specifically, section 3 discusses:

1. Methodological improvements that could be made to the field study to implement a more reliable approach for translating promising trust constructs from epidemiology, healthism constructs from sociology, and social identity-related constructs from social psychology into an epidemiological study that can enhance existing theoretical frameworks describing underlying factors governing vaccination-related decision-making in heterogenous subgroups of parents responsible for the vaccination status of their school-aged children; and
2. Public health implications of the pilot study culminating in the proposal of a new intervention that hypothetically can reduce NME rates by improving intergroup relations between exempting parents and conventional medical/health authorities.

Chapter 6 discusses specific methodological problems related to unreliable assessment of the healthism, trust, and social identity-related constructs in the field study. Imprecise assessment of trust in the field study is addressed in a post-hoc analysis by combining a second trust measure that appears to increase the sensitivity of the diagnostic test (with a marginal loss of specificity) that can be utilized to predict the vaccination-related behavior of activist parents (which demonstrates the feasibility of predicting the decision-making predispositions of parents prior to vaccination-related service delivery). Strategies for improving the reliability of epidemiological assessment of healthism and social identity-related constructs in future studies are also discussed. Chapter 6 culminates by proposing two new enhanced models (based on two healthism-level contingencies) integrating social identity-related constructs with Peretti-Watel et al.'s existing model to further enhance subgroup characterization of parents responsible for the vaccination-related status of their school-aged children, explain differential parent subgroup response to mandatory education, and illuminate potential mechanistic pathways for epidemic transmission of NMEs. Chapter 7 makes the case in a selective review that interventions designed to reduce NME rates should avoid approaches that increase levels of parent healthism-related agency (despite evidence that increased agency may reduce defensiveness to health messaging in other health domains unrelated to vaccination), but instead should ideally seek to induce a common superordinate identity to improve intergroup relations between activist parents and conventional medical health authorities through trust enhancement.

Chapter 2: Translating Healthism into an Epidemiological Context

Peretti-Watel et al.'s theoretical framework posits that the relationship between trust in conventional health authorities and risk culture/healthism describes the vaccination-related decision-making process of four distinct parent subgroups. From an epidemiological standpoint, quantitative measurement and comparative assessment of these two constructs across parent subgroups depend on their independence. That is, no correlation – or a small degree of correlation – should ideally exist between the two constructs. On the one hand, Peretti-Watel et al. themselves provide two explicit definitions of healthism that support unique, independent conceptualizations of the trust and healthism constructs:

> …the rhetoric of self-empowerment conveyed by health promotion praises enterprising and entrepreneurial individuals who exercise control over their own behaviors and use information spread by health authorities to maximize their life expectancy. This specific cultural feature is described as healthism… [36, p. 5].

And:

> More precisely, lay people may not distrust vaccines per se but rather distrust the health authorities who are believed to be strongly influenced by vaccine producers… This feature of contemporary societies is closely related to healthism, and some authors have combined these concepts; in such cases, healthism refers to individuals who seek to control their (children's) health, who want to become its informed and rational entrepreneur, but who also express strong doubts about medical authorities and mainstream medicine and are more prone to turn to alternative experts, including on Vaccination issues…[36, p. 6].

In the two passages above, Peretti-Watel et al. provide consistent definitions of healthism, as a movement among individuals seeking greater control over managing the health-related dimensions of their life-styles. However, the relationships between healthism and trust vary. That is, the first passage links healthism with implicit trust in health authorities by suggesting that individuals rely on information generated by heath authorities to advance their healthy

life-style projects. In contrast, the second passage links healthism to explicit distrust of health authorities by explaining that these individuals "express strong doubts about medical authorities and mainstream medicine." By allowing for varying levels of trust across a fixed, stable definition of healthism, Peretti-Watel et al. essentially establish the unique distinctiveness of the two constructs at the conceptual level and suggest that trust is not an inherent definitional component of healthism.

On the other hand, Peretti-Watel et al. refer to definitions of healthism in the second passage that blur definitional aspects of healthism and trust in conventional medical authorities. This possibility of a homological relationship (or high degree of correlation) between the healthism and trust constructs raises a potentially serious doubt from an epidemiological perspective about the validity of measuring and comparatively assessing the constructs across parent subgroups. At principle issue is the distinction between skepticism and distrust. Skepticism is defined here as questioning the commonly held assumption that medical/health authorities automatically should serve as the primary decision-making agent in medical/health encounters between these authorities and lay people. This drive to challenge the high degree of control that conventional medica/health authorities may attempt to exercise over the direction and outcome of medical/health encounters can be viewed as conceptually similar or equivalent to healthism's central principle of lay people asserting responsibility for and control over their own lifestyle health promotion activities. In contrast, distrust is conceptualized as lack of confidence in conventional medical/health authorities to make health-related life-style recommendations for lay people that are competent and free of conflicts of interests, which can be viewed as conceptually distinct from healthism's focus on the increased

agency of lay people in the medical/health encounter. While these definitions are different, with skepticism focusing on the relative power in decision-making (agency) and distrust focusing on the competency and integrity of medical/health authorities, they can still be easily confused with each other.

Translating Peretti-Watel et al.'s theoretical framework into an actual, hypothesis-driven epidemiological study focused on the decision-making processes of parents responsible for the vaccination status of their school-aged children requires clarity of definitions derived through:

1. Reviewing the main analyses of healthism and healthism-related phenomena that began to appear in the sociological literature around 1980 (when healthism began to conceptually diverge from medicalization) [48] to identify common and frequently shared definitional elements of healthism and related phenomena, and then
2. Coalescing the common and shared definitional aspects of healthism into an explicit composite definition conducive to epidemiological measurement and comparative assessment.

Borrowing from the main analyses of healthism and related phenomena appearing in the sociological literature, the socio-cultural phenomenon of healthism can be defined by two core elements. First, in healthism the individual serves as the exclusive site where health states are defined and where health promotion efforts are targeted and pursued, primarily through life-style modification. This means that the social or community determinants of health are frequently ignored. Second, healthism is characterized by a supporting ideology – an ideology of agency – within which individuals (lay people) are required to assert individual responsibility for and control over health and health-related decision-making to promote and maintain

personal health at the individual level [48-55]. In addition, individuals internalizing and reflecting the healthist construct and ideology typically exhibit an enterprising and entrepreneurial behavioral approach, characterized by seizing opportunities that promote healthy life-styles and by managing risks that threaten healthy life-styles. Individuals reflecting high levels of healthism actively seek out health and health-related information, goods, and services in the marketplace, which is comprised of conventional medical and health professionals, alternative practitioners, lay consumer-to-consumer networks, as well as corporations and other business entities operating in the medical and health-related commercial space [50-55].

Healthism is a ubiquitous socio-cultural phenomenon concentrated primarily in the middle class most frequently in western societies (middle classes in other geographies can exhibit healthism tendencies) [49][50][52][55][57] although it's important to note that some authors appear to assume that healthism is ubiquitous and pervades all social-economic strata [51?][52][54]. Healthism, neoliberalism, notions of the "rational, reflexive" self, and modern consumerism share a common, mutually reinforcing ideological foundation that privileges the role of individual responsibility and control [48][50-54][56]. In most scholarly elaborations of healthism and its related phenomena, no explicit connections between the formal definitional elements of healthism and trust (or distrust) in conventional medical and health authorities are established. Therefore, healthism and trust by default are not homologically linked in these analyses [48-53]. More rarely, when scholars do connect distrust of conventional medical and health authorities to middle-class (lay person) adherents to healthism, these scholars attribute expressions of distrust in conventional medical/health authorities to perceived conflicts-of-

interest that can enter into the medical or health encounter [54], which theoretically can entangle trust issues with the foundational construct of healthism, but not with its ideological or behavioral dimensions. Even more rarely, in one seemingly idiosyncratic analysis, distrust of conventional medical and health authorities as a core definitional aspect of healthism [55] appears to be predicated on the misunderstanding that skepticism of conventional authorities is automatically equivalent to distrust, when skepticism may only indicate a desire by the followers of healthism-related ideology to shift the locus of control in medical and health encounters away from health professionals toward themselves.

Nearly all scholarly explorations of healthism and healthism-related phenomena are structured as critiques related to healthism's potential and actual impacts on a wide spectrum of other socio-cultural phenomena, including:

- Generalized de-politicization [49-53],
- Increased general health anxiety [49][50][51][54],
- Health denial (of the distal causes of disease and unease) [49],
- Overconsumption of medical and health-related goods and services [55],
- Increased stress among medical and health professionals [55],
- Generalized health-based stigmatization [48-54][58][59][60], and
- Other social, health-based transgressions against workers, women, and non-white ethnicities [53][58].

The research goal of the current review is not to weigh in on the multi-dimensional critiques of healthism and healthism-related socio-cultural phenomena. Accordingly, healthism critiques are explored only to the extent that they offer insight into the formulation of the definitional

aspects of healthism suitable to epidemiological investigation. Nor, for the same reason, is the research goal to explore the admittedly fascinating mechanisms (illuminated in the critiques by scholars frequently employing a Foucaultian theoretical perspective) by which healthist "ideals" are internalized and promulgated by healthism's adherents (both from the "insider" conventional medical and health professionals and from the "outsider" alternative practitioners, middle-class lay people, and commercial and state actors). The objective of the following review of healthism is to surface the definitional component of healthism, independent from constructs related to the distrust of conventional medical/health authorities, that can be:

1. Most reliably translated into an epidemiological construct, and then
2. Utilized as an epidemiological measurement to assess key hypothesized differences in the decision-making characteristics of parents responsible for the vaccination status of their school-aged children.

Defining the Foundational Construct and Ideology of Healthism as a Middle Class? Phenomenon

In 1980, Robert Crawford authored one of the first elaborations of healthism that appeared in the sociological literature, primarily (but not exclusively) structured as a critique of the healthist orientation underpinning "the new health consciousness" of the 1970s, which included the holistic health and self-care movements [49]. Crawford offers the following definition of healthism: "Briefly, healthism is defined here as the preoccupation with personal health as the primary – often *the* primary – focus for the definition and achievement of well-being; a goal which is to be attained primarily through the modification of life styles with or without therapeutic help [49, p. 368]." Identifying healthism as a middle-class phenomenon of

the late 20th century based in the United States, Crawford acknowledges that healthist ideology, which privileges notions of individual responsibility and control, can lead to improvements in health and well-being at the individual level (in the personal, private sphere as opposed to the public, communal sphere) [49]. It is important to recognize that Crawford's definition does not "rule in" or "rule out" the utilization of professional expertise to advance the healthist project and does not connect trust (or distrust) of conventional medical or health authorities to the core healthist construct (of a highly privatized, life-style focused approach to health) or healthist ideology (emphasizing personal responsibility). In addition, Crawford identifies health as a dominant "super health" value that subsumes other categories of social values typically not viewed as related to health (e.g., religion) [49].

Pelters and Wijma appear to concur with Crawford's analysis of healthism's sprawling reach by arguing that the primacy of health as a super value has incorporated "the general major structures of a religion" to such an extent that it appropriately can be considered a "health religion" [58]. Furthermore, as his main thesis, Crawford argues that the healthist approach creates a dangerous illusion that the social determinants of health and well-being can be successfully ignored, and uncritical acceptance of this illusion by the adherents of healthism results in the de-politicization of the middle class [49]. In addition, Crawford asserts that the healthist ideology focusing exclusively on the subjective (personal, private) experience of health is ultimately:

1. "Health-denying," as the healthist preoccupation with personal thriving ultimately undermines recognition of, and engagement with, the more distal causes of health threats related to socio-political conditions;

2. Anxiety-inducing, as the healthist's exclusive focus on privatized, personal health improvement is unceasing without a definable endpoint, and therefore, ultimately unattainable; and
3. Stigmatizing, as healthists are prone to judge the sick as deficient in their exertion (of the ethic) of personal responsibility (and not presumably as otherwise worthy individuals caught on the wrong side of social forces contributing to the loss of health or well-being) [49].

By 2006, while launching a comprehensive exploration of the socio-cultural implications of the control-anxiety cycle engendered by the ideology he previously linked directly to healthism (without actually utilizing the term healthism), Crawford continued to situate individual responsibility and control at the ideological core of health consciousness in the American middle class [50].

> Middle-class optimism and identities are invested in the ideal of personal control. Individualized health promotion provides the denotative and connotative language for do-it-yourself bootstrapping. Health is a language of a class that, even, as it disintegrates, continues to believe in its self-making salvation. Health practice lends itself to a logic of survival: individuals must do what they can to protect themselves from harm. Yes, fear has a way of escaping the boundaries prescribed for it; but individual control, the ideological heart of contemporary health practice, builds a wall that will not be easily breached [50, p. 419].

The ideology of personal responsibility elucidated in the above passage, reflected in the phrases "do-it-yourself" and "self-making," clearly places the onus on individuals to take action in their own personal, private spheres, in order to lift up, save, and "protect" themselves from threats to their own health or well-being.

According to Crawford, domination of the ideology of personal responsibility in the American middle-class is highly resilient to challenges from other ideological perspectives

privileging the social determinants of health and well-being. Within this conceptualization of healthism, anxieties over threats to health and well-being that can potentially spill over to, and require collective action in, the social realm are typically rechanneled into the personal, private sphere and addressed there exclusively through efforts to transform personal life-styles. The role of personal control is so dominant in health consciousness that Crawford identifies it as a central defining characteristic of American middle-class identity.

> As the social recedes, health – along with myriad related pursuits – fills the void, providing purpose, meaning, and a sense of urgency to life so constructed. The social cynosure of health saturates the imagination with worries and tasks. Expansively, health becomes the "what is to be done" of private life. 'Take responsibility for oneself' and 'determining one's own destiny' supplied the ethical rationale for privatization. In turn, the private sphere offered the only home in which values could flourish [50, p. 411].

Crawford further links health and identity in the above passage by observing that "purpose," "meaning," and "urgency" are generated through health pursuits at the individual level. Critically, he asserts that health is the primary focus of "private life" that can be accomplished by individuals actively shaping their own destinies. In other words, individuals are required to take health matters into their own hands and identify health-related goals and solutions they can take full control of realizing through effective personal health decision-making.

Julianne Cheek appears to share Crawford's perspective that contemporary healthism discourses focus exclusively on the role of individual responsibility for and control over decision-making related to life-style changes made to (presumably) enhance health and well-being [51]. However, seemingly devoting less attention to Crawford's primary concern over healthism's role in diverting attention away from the social determinants of health and well-being in the U.S. context, Cheek instead focuses on healthism's potentially negative

implications on individuals, including: 1. The intense pressure on individuals to meet ever-changing life-style standards, which can lead to constant dissatisfaction and anxiety; and 2. Failure to live up to such standards, which can lead to stigmatization [51]. Cheek argues that individual responsibility for and control over health-related pursuits is not equivalent to individual freedom over the same, as the "enabling state," in coordination with medical and commercial interests, establishes limits over freedom of choice (or "delimits" freedom of choice) by "steering" individuals towards life-style focused health pursuits [51].

> The individual is regulated in new and different ways and in relation to health-based rhetoric and understandings "represented and encouraged to think about themselves as individuals who calculate about themselves, 'add value' to themselves [for example, by looking good or losing age], improve their productivity, strive for excellence and live an existence of calculation (Ball, p. 217). This forms part of the discourse of "performativity" that has permeated, transformed, and shaped contemporary healthism rhetoric [51, p. 981].

In the above passage, Cheek describes the mechanism by which the ideology of healthism functions to "re-regulate" individuals through an exclusive focus on the concept of "performativity" (or healthy life-style optimization). Individuals are encouraged, and, in fact, expected as part of their normative assumptions about themselves (through a process of internalization), to take on an active role in making decisions (or calculations) about their health and health-related pursuits. At the same time, health-related decision-making parameters and behaviors are narrowly defined and constrained by both internal and external forces. Decisions and attendant actions are required to enhance performance at the individual level (that is, at the level of the individual body), exclusively through life-style changes executed in the personal, private sphere. Individuals who succeed at improving the body's performance are praised and held up as valorizing examples, while individuals who fail to reach the performance standard

are blamed for failing to live up to health expectations. Although Cheek does not describe healthism as a specific dimension of middle-class identity, she appears to describe this "existence of calculation" in respect to healthy life-style optimization as a general hallmark of individual identity in Western societies.

Ayo (similar to Crawford) also expresses concern over the waning attention given to the social determinants of health beginning with the new health consciousness that burst onto the scene in Western societies in the 1980s [52]. However, while analyzing the shift away from the more distal or "fundamental" (to employ Ayo's term) aspects of health such as employment and educational status to the more proximate, privatized considerations of health (like daily exercise), Ayo more thoroughly probes the ways neoliberal political ideology influences healthist ideologies, including:

1. Retreat of the state (from efforts to address socially-based inequities through structural reform),
2. Ascendency and domination of the market (with professional experts and commercial actors seeking to fill the void left by the state through exclusively (or nearly so) addressing health needs at the individual level),
3. Risk management (everyday risk is managed at the individual level through life-style modifications), and
4. Preoccupation with personal responsibility (the social is turned into the personal) [52].

In addition, aligned with the concerns expressed by Crawford and Cheek over the possible stigmatizing consequences of healthist ideology, Ayo explores the role of personal choice as another important principle of neoliberal political ideology that can lead to the stigmatization

of individuals who are perceived to fail at meeting the obligations of healthy life-styles as determined by health professions and corporations with health-related interests. Ayo asserts that the ideologies of healthism and neoliberalism coalesce to reinforce the privileging of individual responsibility in health promotion discourses in western societies: "…this type of health mania [exploding in the 1980s and 1990s] has been made possible in the context of a capitalistic neoliberal climate, whereby healthism and neoliberalism mutually reinforces the vision of the responsible entrepreneurial citizen (Crawford, 2006)" [52, p. 100]. In other words, citizens in capitalist, neoliberal societies are expected, even obligated, to take action as informed consumers, to actively exercise individual responsibility for and control over the wide array of life-style choices available to them on a daily basis, and to ultimately select the life-style prescriptions delimited by health professionals and commercial actors. Notably, Ayo appears to assume that the ideology of individual responsibility has pervaded western societies so thoroughly that all social-economic groups have uncritically accepted it in equal measure; Ayo's work does not appear to consider that members of the middle class are more likely than others (e.g., workers) to be shielded from the social determinants of disease and unease (e.g. unemployment) and to possess the purchasing power necessary to fulfill an unceasing stream of lifestyle prescriptions.

Harjunen differs markedly from Ayo in explicitly identifying healthism as a socio-cultural phenomenon associated closely with the middle-class (in both the specific context of Finland and the broader context of western societies): "Healthism is an ideology and practice that favours those who can dedicate time, money, and effort to taking care of their bodies; it therefore targets and is driven by the middle and well-to-do classes" [53, p. 71]. However, both

Harjunen and Ayo maintain that neoliberal political ideology and healthism share a common, mutually reinforcing ideological foundation privileging the role of individual responsibility for and control over health promotion-related attitudes and activities (exclusively focused at the individual level). For example, Harjunen writes "Healthist thinking prescribes that health is achieved as a result of an individual's own choices concerning lifestyle, behavior, and attitudes; indeed any success or failure, for that matter, is an individual's own responsibility. In this way, it comes remarkably close to the neoliberal idea of a self-reliant and self-governing individual" [53, p. 70). In the above passage, in addition to emphasizing that healthism ideology requires individuals to exclusively limit their health promotion efforts to the personal, private realm of life-style modification, Harjunen argues that the individual health entrepreneurialism required by healthism mirrors the "self-reliant," "self-governing" individualism required by neoliberal political ideology. Harjunen and Ayo appear to share another significant perspective on the potential overlap between neoliberal political ideology and healthism: while Harjunen never explicitly links healthism to the neoliberal principle of market fundamentalism in the same fashion as Ayo, Harjunen recognizes the powerful interplay that exists between market forces and the healthist mandate to improve health exclusively at the individual level. Individuals are offered access to a wide array of medical devices not previously available to take home (e.g., blood pressure monitors) and health advice from new, non-traditional sources (which may conflict with recommendations made by conventional medical and health authorities) [53]. By implication, individuals in healthist societies must assume an active, entrepreneurial approach to effectively seize opportunities for life-style improvements and minimize life-style risks in

health-related marketplaces characterized by the increased availability of more varied, complex technological options and conflicting advice.

> In a nutshell, healthism means that health is understood as the primary basic constituent of an individual's life and thus a priority in all one's efforts. Everything done, and every choice made, is evaluated through the lens of its effect (whether real or assumed) on the individual's health. It could be said that in a culture permeated by healthism, health is not something one automatically "has" any longer; it has to be earned through a continuous personal project requiring systematic work and strong commitment (c.f. Shilling 1993) [53, p. 68].

In other words, individuals – in the mold of entrepreneurs – are required to unceasingly evaluate opportunities for health-based, life-style advancements and to constantly manage health-based, life-style risk. Persistent, intentional effort must be applied to make the life-style "project" successful.

Furthermore, Harjunen agrees with Crawford, Cheek, and Ayo that healthism ideology fosters the illusion that the social determinants of health do not matter and that structural reform is not needed to address inequities in the wider social system, which results in de-politicization. In addition, Harjunen, Crawford, Cheek, and Ayo agree that healthist ideology with its exclusive focus on the privatization of health as a matter of individual responsibility and control promotes stigmatization of individuals who are perceived to make "irresponsible" health choices. Harjunen specifically critiques the healthist tendency to stigmatize fatness, as overweight individuals are frequently assumed to be unhealthy and incapable of making responsible life-style management decisions. Finally, Harjunen introduces the related but novel critique that the "ideal" (white middle class) body promoted by healthism ideology leads to transgressions against women, workers, and non-white ethnic groups who are perceived as failing to live up to the "ideal" of the white middle class body: "Health and what is considered a

normative embodiment of health is for example gendered, classed, and racialized (Broom 2008, p. 132)" [53, p. 69].

In a similar fashion, Kristensen et al. express concern over healthism's stigmatizing capacity through analysis of 34 individual interviews conducted in Denmark during a period in the early 2010s (exact dates not provided), when Denmark experienced a critical transition from a state-operated, publicly -funded healthcare system to an increasingly privatized, market-oriented health-care system [54]. After observing that respondents tended to notice variation in the capacity of their peers to successfully make personal health-enhancing lifestyle decisions, Kristensen and colleagues argue that healthism's preoccupation with the role of individual responsibility as the centerpiece of life-style management can result in "a socially dividing practice," as individuals perceived as appropriately exercising individual responsibility are praised, while individuals perceived as falling short are stigmatized [54]. In addition, Kristensen et al. appear to assume that the socio-cultural phenomenon of healthism is equally distributed across socio-economic strata in Denmark and not exclusively focused in the middle-class (perhaps due to the generally high standards of living enjoyed in the Scandinavian countries). Kristensen et al. define healthism as: "…a crafted lifestyle that prioritizes health and fitness over everything else and relies on individuals' drive and motivation to achieve these aims" [54, p. 486]. This emphasis on "crafted lifestyle" exclusively situates health promotion activities in the realm of the personal, private sphere, which appears to align with and reinforce Crawford's earlier definition. In addition, Kristensen and colleagues observe that respondents tended to articulate healthism's ideological emphasis, privileging the role of individual responsibility for and control over life-style management decisions.

> Generally, informants were eager to share their reflections in that such [life-style] choices were very much an individual and private matter, and that they themselves were capable of self-management and self-responsibility. The neoliberal stance that comes through in respondents' views echoes Crawford's analysis of healthism as a privatization of the struggle for well-being and well as Rose's (1998) point that health is increasingly withdrawn from state bureaucracies and considered a personal enterprise [54, p. 494].

That is, the mutually reinforcing confluence of healthist and neoliberal ideologies requires individuals to become a new kind of health entrepreneur who is constantly on the lookout for and ready to embrace new opportunities for personal health-based, life-style management.

The individual must also remain equally attentive to emerging threats to the deeply personal project of achieving an optimized health-based life-style. Kristensen et al. challenge the view that individuals are abandoned by the neo-liberal state and completely left alone to fend for themselves in health and health-related marketplaces dominated by the priorities of conventional health professionals and corporate actors. Instead, these scholars argue that individuals deftly navigate these "corrupted" marketplaces by seeking out the assistance of other lay people and alternative practitioners. That is, individuals manage their doubts about conventional medical and health authorities (arising from perceptions that increasing medicalization can result in these authorities placing their professional or personal interests above the interest of patients/clients), corporate actors (arising from perceptions that corporations work in concert with the state and conventional medical professionals to advance their own commercial interests at the expense of individual citizens), and representatives of the State (arising from perceptions that the neoliberal state is only interested in health in so much that it increases the productive capacity of individual citizens) by seeking out new sources of "counter-expertise" to help manage health-focused life-style related opportunities and risks

[54]. "…[C]onsumers turn to their own embodied experiences (cf also Kirstensen et al., 2013), to peers willing to share their personal embodied experiences and, not least, to a plethora of alternative market agents that are seen as relatively innocent and trustworthy and act as a moral compass in comparison to both the state and the market agents [54, 499]." That is, when not relying on their own self-generated health expertise, individuals actively search out "consumer-to-consumer" networks and alternative practitioners perceived to be working outside the interlocking system of conflicted medical, state, and corporate interests for access to sources of information that are perceived to be untainted and trustworthy, to guide their health-related lifestyle decision-making [54].

Disentangling Healthism and Trust (in Conventional Medical and Health Authorities)

Distrust of conventional medical and health authorities is conceptually dependent on the foundational construct of healthism, yet conceptually independent from the supporting ideology of healthism and the behavioral dimensions of healthism. That is, the foundational construct of healthism, that the individual body is the primary location where health states are defined, located, and treated, can be understood as contributing to increased medicalization that results in the types of conflicts of interest (e.g., unnecessary treatment) which can undermine trust in conventional medical/health authorities. The exclusive focus on the individual body as the site where health is defined and pursued can allow social problems to be redefined as health phenomena, which increases the amount of goods and services that can be offered during the medical or health encounter. This potentially opportunistic (self-serving) situation can raise doubts over whether conventional medical and health authorities can always be trusted to act in the best interests of their patients or clients when encountering

opportunities to expand their professional authority or to improve their personal livelihoods (through increased billing). In contrast, distrust of conventional medical and health authorities can be viewed as conceptually independent of the supporting ideology of healthism (individuals are required to assert responsibility for and control over the health-focused life-style decision-making process), as the act by healthist lay people to shift the locus of control away from conventional authorities to themselves in the medical or health encounter is not equivalent to the act of expressing distrust of conventional authorities (although distrust can accompany this *de-centering* of conventional authority in a temporal sense, and even contribute to it). In addition, distrust of conventional medical and health authorities can be viewed as conceptually distinct from the behavioral dimensions of healthism: while the choices and activities of enterprising and entrepreneurial healthist lay people navigating a crowded marketplace of health and health-related information, goods, and services can be guided and even shaped by levels of trust in conventional medical and health authorities, distrust is not the driving force of such activity, which can be more accurately attributed to the ideological component of healthism, that healthist lay people wish to retain enhanced control over the direction of their health and health-related destinies.

In a parallel fashion, Trisha Greenhalgh and Simon Wessely argue that members of the middle-class influenced by the healthist approach (predominantly, but not exclusively, in Western societies) tend to trust health recommendations made by "lay experts" (representing another type of peer-level category) who are perceived to be more authentic in the sense of being perceived to have fewer conflicts of interest than conventional medical authorities [55]. Greenhalgh and Wessely's definition of healthism also includes the essential healthist elements

identified by the other commentators on healthism – namely that healthism requires individuals to view themselves as the primary agent of health promotion, to actively seek out health and health-related information for the purpose of increasing personal health awareness and applying this knowledge in service of improving health at the individual level, in the personal, privatized sphere commonly known as life-style – Greenhalgh and Wessely's definition of healthism differs from the others in two fundamental ways, by:

1. Including distrust of conventional medical and health authorities as a primary definitional element and
2. Explicitly including tendencies of individuals with healthism characteristics to pursue alternative life-style choices and to sympathize with or accept folk-based approaches to disease risk and solutions.

By incorporating the above two elements, Greenhalgh and Wessely appear to idiosyncratically entangle the issue of trust with the primary defining characteristics of healthism.

However, in comparison to Kristensen et al., Greenhalgh and Wessely devote scant attention to exploring the origins of the rise in distrust of conventional medical authorities that accompanied the simultaneous emergence of the healthism movement. Greenhalgh and Wessely do link the trend of rising general skepticism of professional authority to the work of Deborah Lupton: "Her empirical work was based on a review of the literature on the 'rational, reflexive self' as a product of late modernity; that is, the self who acts in a calculated manner to engage in self-improvement and who is skeptical about expert knowledge" [55, p. 203]. Greenhalgh and Wessely equate Lupton's conception of skepticism of expert knowledge to

distrust of expert knowledge and thereby accept the presumption that self-improvement and professional distrust are inextricably correlated in their multi-faceted definition of healthism.

> Healthism is a well-recognized social-cultural phenomenon in the Western (and Westernized) middle classes, characterized by high health awareness and expectations, information seeking, self-reflection, high expectations, distrust of doctors and scientists, healthy and often alternative lifestyle choices, and a tendency to explain illness in terms of folk models and invisible germ-like agents and malevolent science [55, p. 2010].

This definition, which is based on 1. elements of Lupton's work, 2. the self-actualization based theory of Abraham Maslow, 3. theories related to the underlying power dynamics of the doctor-patient relationship, and 4. folk conceptions of disease vulnerabilities and remedies, combines healthism constructs, consumption (based on a peer-to-peer model), and folk-based approaches to health promotion. Most importantly, it also entangles distrust of conventional medical and health authorities with other components of healthism. By doing so, Greenhalgh and Wessely do not consider that other sources of professional distrust can exist (e.g., conflicts of interest).

Greenhalgh and Wessely themselves acknowledge through their analyses of the works of Lupton and Alberts et al. that the conflicting tendencies of distrust/seeking alternative health advice and trust/seeking conventional health advice can co-exist simultaneously in the same individual depending on the context of the health situation (e.g., the severity of the health threat). If levels of trust in conventional medical and health authorities can vary within individuals, depending on the specific contexts within the medical or health encounter, the healthism characteristic identified by Greenhalgh and Wessely as *distrust* of conventional medical and health authorities is probably more appropriately identified as *skepticism* of professional expertise (which is essentially a contestation over where the locus of control

should be located in medical or health encounters). Consistent with this definition, it follows that patients or clients may wish to assert more control over the medical or health encounter when the health stakes are relatively low and relinquish control (that is, to assume a more passive role) when the stakes are relatively high (life v. death) in the medical or health encounter. It is problematic, therefore, for Greenhalgh and Wessely to automatically equate skepticism of professional expertise to distrust of professional authority in the medical or health encounter AND include distrust of professional authority as a definitional element of healthism, as levels of skepticism of professional expertise may vary within individuals depending on the specific context of the medical or health encounter.

Finally, in Greenhalgh and Wessely's critique of healthism, by equating healthism to "health for me," they express concerns related to: 1. Potential overconsumption (characterized by "conspicuous consumption") of health-related goods and services and 2. High stress levels experienced by medical and health professionals who find themselves increasing confronted by healthist-empowered patients [55]. Greenhalgh and Wessely appear not to explicitly examine the potential stigmatizing consequences of healthism. However, they do express concern over potential health inequities attributable to differential access to health and health-related information [55].

Deborah Lupton never employs the term "healthism" in her analysis of 60 individual interviews conducted with a diverse group of lay people regarding their own perceptions and media portrayals of doctors and the doctor-patient relationship in Sidney, Australia in the mid-1990s [56]. However, through her analysis of the joint influences of the ideological impacts of consumerism and the "sociological notion" of the rational, "reflexive self" on "the medical

encounter" between doctors and patients, Lupton ultimately clarifies the relationships between essential healthist constructs, doctor and patient roles, and the extension of trust to conventional medical and health authorities.

> There is, therefore [immediately following an explanation of the "reflexive self"], a congruence between the notions of the "consumerist" patient and the "reflexive" actor. Both are understood as actively calculating, assessing, and, if, necessary, countering expert knowledge and autonomy with the objective of maximizing the value of services such as healthcare [56, p. 374].

The active calculation and assessment defined by Lupton as the foundational aspects of consumerism and rational reflexivity are consistent with the core of healthist ideology that requires individuals to constantly exert personal responsibility for and control over their own health-related life-style choices at the individual level. That is, the consumer, the reflexive patient, is *consistently* thinking and behaving autonomously and *only* cedes personal autonomy over health decision-making to doctors when necessary to realize the goal of achieving optimal health outcomes at the individual level. Challenging professional authority then represents a vital assertion of autonomy and independence and the rejection of the passive role in the medical encounter. Challenging authority is not an automatic expression of distrust in conventional medical and health authorities by patients who ultimately embrace personal responsibility for and require control over their own health decision-making processes. Lupton illustrates the value that middle-class respondents place on asserting personal control over their own health decision-making in the medical encounter by excerpting two interviews.

The first interview excerpt features a middle-class woman (ethnicity not provided) with a master's degree who refuses conventional medical treatment after receiving a leukemia

diagnosis out of fear of lapsing into a passive patient role and losing personal control of her health state as a result.

> I couldn't explain to [the specialists] that there was a point beyond which I could not go. I didn't want to become hospitalized. I didn't want to become medicalized. I still wanted my dignity. They became fixated on the fact that I kept saying that I didn't want to lose my hair. But the hair just was a symbol of what I would be losing. It was – I didn't want to turn into a poor thing. I I didn't want to be dependent. I didn't want to be bleating to friends, "Please help me." Because as you can see from what I said, my entire attitude has been you are stoic, you must bear it, you manage yourself, you don't go under. And that is simply so intrinsic to the way I think that I won't have it [treatment] [56, p. 379].

The respondent affirms the significance of retaining personal control over the medical encounter by expressing such a strong fear of losing the very same sense of control that would inevitably follow, or so she believes, from accepting potentially life-preserving treatment. Importantly, nowhere in this excerpt does the respondent distrust the accuracy of the diagnosis or dispute the efficacy of the proposed treatment (although admittedly the respondent does express dissatisfaction with the insensitivity of the care-team). The above passage vividly illustrates that rejecting the authority (expertise and autonomy) of the conventional medical and health establishment *is not* equivalent to expressing distrust of that authority although distrust of conventional medical authority can certainly accompany, or can even result in, rejection of it.

The second interview excerpt features a middle-aged male professional (ethnicity not provided) who expresses a desire to assert greater personal control over the medical encounter for the purpose of improving his own individual health outcomes.

> You know, I am a professional too and I know how much better a job I can do for my client if I have a client who will challenge me and ask me questions and tell me what outcome the client is looking for, how the client likes to go about it

> and so on and so forth. And I can see the right "patient/doctor team", if you like, can produce a much better result and be more satisfying on both sides [56, p. 379].

The respondent does not challenge conventional medical authority by questioning the competency of doctors or by expressing distrust of doctors' recommendations, but rather indirectly rejects the traditional passive or dependent role of the patient in the medical encounter. While Lupton identifies and elucidates the primary consumerist and reflexive characteristics that middle-class patients tend to bring to the contemporary medical encounter, she notably cautions against automatically restructuring the nature of medical encounters based exclusively on the privileging of the consumerist and reflexive tendencies of patients. Lupton argues that such a transformation would deny some patients the personal freedom to assume a more passive role if desired (especially in the case of life-threatening disease) and would eliminate opportunities in the medical encounter for patients to express the unique vulnerabilities and emotions that frequently accompany serious illness [56].

Expression of elevated levels of personal control in health-related decision-making and in the medical encounter by the middle class, consistent with the healthism movement, is supported by Alberts et al. (who, in the same fashion of Lupton, never invoke the term "healthism"). In a cross-sectional study of 2,248 adults residing on the island of Curacao (with age nationally represented, but with females slightly over-represented) conducted in the mid - 1990s (exact dates not provided), Alberts et al. employ a composite or multi-dimensional variable designed to ascertain an integrated measure of an individual's degree of health knowledge, proximity to professionals, and level of personal health control to: 1. Assess and classify levels of proto-professionalization (the degree to which lay people mirror the health attitudes and behaviors of health professionals) and 2. Assess hypothesized associations

between levels of proto-professionalization (low, middle, and high) and health-seeking behavior (i.e., visits to the general practitioner or specialist) for common and serious conditions [57]. Alberts et al. report:

1. Individuals classified as “high” on the proto-professionalization index exhibit reduced odds of visiting a “health care professional” for common ailments (backache), compared to reference (individuals classified as low on the proto-professionalization index).
2. Individuals classified as “high” on the proto-professionalization index exhibit (statistically) equivalent odds of visiting a professional for more serious conditions (hypertension), compared to reference.
3. Individuals classified as “high” on the proto-professionalization index exhibit greater odds of visiting a specialist for more serious conditions, compared to reference [57].

As noted by Alberts et al., individuals classified as “high” on the proto-professionalization index likely demonstrate greater self-responsibility to manage common symptoms, depend on health professionals to the same degree as others to manage more serious conditions, and achieve greater access to specialist care when experiencing more serious conditions. In alignment with the healthist ideology requiring individuals to assume personal responsibility for and control over health promotion efforts, individuals with proto-professionalization tendencies appear to exert: 1. Elevated levels of personal control over common symptoms by managing their conditions themselves, and 2. Cede limited degrees of personal control to their general practitioners when experiencing more serious conditions while still retaining significant degrees of control over the medical encounter by persuading the general practitioner to grant a specialist referral. The efforts of proto-professionalized patients to seek a specialist referral can

be viewed as highly enterprising; this active, entrepreneurial approach to health information seeking for the purpose of improving personal health at the individual level is consistent with the socio-cultural phenomenon of healthism. In addition, the drive exhibited by proto-professionalized patients to seek consultation with a specialist following an initial visit to the general practitioner can be interpreted as proto-professionalized patients confiding at least a limited measure of trust in conventional medical and health authorities, which illustrates that trust in conventional medical and health professionals can exist on a continuum from low-to-high, independent of healthist constructs.

Notably, Alberts and et al.'s findings are consistent with Lupton's observation that the consumerist, reflexive patient (that is, patients with tendencies than can also be defined as healthist) is more likely to cede personal control to the doctor and assume a more passive role in the medical encounter when experiencing the unique (body-related) vulnerabilities and strong emotions associated with serious illness. Furthermore, Alberts et al. provide a mixed critique of proto-professionalization: on the one hand, the tendency to self-manage more benign conditions can empower individuals and reduce health-care cost, while, on the other hand, the tendency to seek health information and recommendations related to more serious conditions from every conceivable source can lead to unnecessary utilization of expensive specialist services (reminiscent of Greenhalgh and Wessely's concern over "conspicuous consumption") [57].

Mauro Turrini appears to approach healthism as both a socio-cultural phenomenon and an analytical framework when tracing the evolution of healthism from its emergence as an initial concept in the 1970s through its development as an increasingly sophisticated analytical

framework up until the mid-2010s. The bulk of Turrini's analysis focuses on the period after 1980 when healthism breaks away from medicalization and "becomes an autonomous concept" [48, p. 17]. Turrini argues that beginning around 1980, healthism (when viewed as a socio-cultural phenomenon?) unfolds in 4 directions:

1. Lay people assert more personal control over their health promotion activities,
2. Health promotion activities of lay people are concentrated in the domain of life-style,
3. Health is exclusively defined and addressed at the site of the individual, who accepts responsibility for its promotion and maintenance, and
4. Health promotion at the individual level through life-style modification becomes a moral obligation, which leads to "blaming" when the standards of "good living" are not achieved [48].

While elucidating healthism as an analytical framework, Turrini appears to express ambivalence, or even uncertainty, over the role of doctors in the life-style management approaches to health of lay people, but appears to essentially agree that healthist lay people are increasingly asserting greater levels of agency within and beyond the health encounter. For example, at one juncture, Turrini appears to argue that the role of doctors is diminished under healthism: "A sort of medicalization without doctors, healthism may be defined as the analysis of a set of attitudes, behaviours, and emotions that result from the elevation of health as a pan-value and committed to a more active engagement of patients in the process of health-care" [48, p. 18]. However, the phrase "more active engagement of patients" seems to suggest more of a shift in the locus of control in the medical encounter away from the doctor towards the patient than a complete doing away with the potential or actual influence of doctors (as

seemingly suggested by the phrase “medicalization without doctors”) on the healthy life-style decision-making process of patients. In addition, Turrini appears to suggest, at another point, that doctors continue to play a role in supporting the otherwise self-directed efforts of patients to manage healthy life-styles.

> Lifestyle, as constructed in terms of risk factors associated with the ever-expanding notions of health, is integrated into the traditional model of medical service provision that becomes an important vector of this new ideology of health. General practitioners are the pastors of this new form of hygienism, which takes place not in society, but in the individual space of the doctor-patient encounter, by deploying a number of new bio-entities (triglycerides, blood hypertension, advances maternal age, etc.) and tools, such as screening tools, check-ups, risk thresholds, which travel beyond the clinic and become part and parcel of popular culture, as far as they enter and are re-appropriated by laypeople’s experience (Turrini, 2014) [48, 19].

Turrini appears to suggest that individuals manage their health-based life-style decisions both within the framework of the medical encounter and beyond it. The “new form of hygienism” refers to the promotion and maintenance of healthy life-styles at the individual level, and Turrini specifically notes the role that doctors play in encouraging healthy life-style modifications in their patients. In addition, Turrini emphasizes that patients carry their pre-occupation with life-style centered health promotion activities beyond the medical encounter, which illustrates the degree to which patients assert individual responsibility for and control over health-focused life-style modifications in the personal, privatized sphere.

Translating the Ideological and Behavior Dimensions of Healthism into an Epidemiological Measurement

Opel at al. in developing a proposed survey, based on focus group research, to identify vaccine hesitant parents recommend adding this novel question: “It is my role as a parent to question shots,” which is intended to assess the role of parental health advocacy directly [47] and therefore is potentially suitable for measuring levels of healthism expression in parents (as

pointed out by Peretti-Watel et al.) [36], and comparatively assessing levels of healthism expression across parent subgroups. However, this question potentially combines the concept of trust in conventional medical authorities with the concept of parental agency in vaccination-related decision-making in a homological fashion (creating an overlap between the definitional aspects of the two variables). In other words, it is not clear whether the question is evaluating whether parents are questioning (or not questioning) their children's shots based on their level of trust in the doctor, or whether parents are questioning (or not questioning) their children's shots based on their desire to assert greater (or lesser) degrees of agency in the vaccination-related medical encounter. In addition, this question could inadvertently spur agnostic parents to consider whether they should assert greater degrees of agency in the vaccination-related health encounter, which theoretically (and counterproductively) could result in these parents shifting positions into the activist parent subgroup. Instead, an alternative question measuring levels of expressed parental healthism is needed that more precisely ascertains the degree to which parents assert agency in vaccination-related medical and health encounters; that is, the degree to which parents assert responsibility for and control over vaccination-related decision-making for their school-aged children without inadvertently creating a homological relationship between parents' agency and trust in medical/health authorities. While reliable assessment of healthism and trust as independent constructs can help to improve subgroup characterization of agnostic and activist parents and subsequently can provide important insight into the vaccination-related decision-making processes of these parents, it is not sufficient to fully understand the multi-dimensional decision-making architecture that ultimately differentiates these and other subgroups of parents responsible for the vaccination status of their school-

aged children and that potentially explains why some parent subgroups respond positively to convenience-based nudges by accepting vaccination, while others appear to become increasingly alienated by it.

Chapter 3: Translating Social Identity Theory, Social Categorization, and Social Identity Threat into an Epidemiological Context

Conventional educational interventions directly challenging the deeply held beliefs of actively (vaccine) delaying and/or refusing parents have not borne fruit due to the seemingly unfalsifiable strength of anti-vaccination beliefs held by this parent subgroup. Friesen et al. raise the possibility that individuals embrace unfalsifiable beliefs to meet deeper psychological needs, including identity needs linked to group membership: "We suggest that when people turn to unfalsifiability, it is because these "practical issues"—for us existential motives—like having positive self-worth, being a valued group member…have temporarily trumped questions of belief accuracy or testability" [61, p. 524]. Applying these insights helps to create an increasingly multidimensional understanding of agnostic and activist parents beyond levels of healthism and levels of trust in conventional medical/health by including social identity-related needs. Increasingly nuanced characterization of these parent subgroups is necessary to more clearly understand:

1. Why policy level interventions that add inconvenience to NME filing procedures appear to nudge agnostic parents toward vaccination and why mandatory waiver education appears to spur increased defensiveness and alienation in activist parents,
2. The subsequent necessity of replacing educational approaches that seek to falsify the vaccination-related beliefs of activist parents (as the original objective) with a new approach more attuned to meeting the social identity needs of this unique parent subgroup in order to increase intergroup harmony between these parents and public health professionals, and

3. The appropriate redesign of the mandatory educational session that can offer activist parents membership in a more inclusive shared identity category while maintaining their unique subgroup identity as a way to:
    a. Reduce social distance between activist parents and public health professionals,
    b. Reduce levels of intergroup bias, and
    c. Increase levels of intergroup trust.

To clarify why variation in parent response to increasingly complex NME filing procedures that include mandatory waiver education appears to exist and how this new understanding can be leveraged to develop more effective interventions for activist parents, a new methodological approach is necessary that casts Friesen et al. as an important point of departure. This approach investigates the underlying social identity related needs, including the need to respond to and counter threats to social identity, that otherwise reinforce the unfalsifiable convictions persistently expressed by activist parents. Hypothetically, for example, if activist parents exhibit greater sensitivity to questions probing the value of social encouragement when considering vaccination and the value of social support when considering changes in vaccination-related beliefs, compared to agnostic parents, this finding may signal that the social cost of reconsidering the vaccination status of their school-aged children may be too high for activist parents to seriously entertain. Therefore, a novel intervention at the minimum would be required that: 1. Avoids inadvertently triggering social identity threat in actively delaying and/or refusing parents; and 2. Offers these parents membership in a more inclusive shared superordinate identity category as an equitable “social exchange” for the social identity displacement that may accompany changes in their vaccination-related beliefs.

Social identity theory, and closely related notions of social categorization and social identity threat, can be employed to enhance general understandings of why well-intentioned attempts to falsify the vaccination-related beliefs of activist parents who seek NMEs for their school-aged children undertaken during health encounters (between public health professionals and parent clients) typically fail. These same theories can also increase understandings of why falsification attempts made by public health professionals in this context can backfire and potentially result in the intensification of vaccine-delaying and vaccine-rejecting beliefs in activist parents who file NMEs for their school-aged children. At its most fundamental level, social identity theory "…sets out to explain group processes and intergroup relations" [38, p. 255] and is based on the construction of cohesive and distinctive social categories:

> The basic idea is that a social category (e.g., nationality, political affiliation, sports team) into which one falls, and to which one feels to belong, provides a definition of who one is in terms of the defining characteristics of the category – a self-definition that is part of the self-concept [38, p. 259].

Individuals membership in multiple social categories translates into multiple subgroup identities. Subgroups inspire and guide members to align their thoughts, emotions, and actions with the central defining characteristics of their (multiple) subgroup identities in order to establish and maintain the sense of belonging that membership entails. "Each of these memberships is represented in the individual member's mind as a social identity that both describes and prescribes attributes as a member of that group – that is, what one should think and feel, and how one should behave" [38, p. 259-260]. Consistent with the above principles of social identity theory and the related idea of social categorization, in the context of a health encounter, public health professionals can be thought of as belonging to a distinct subgroup

with a unique self-identity organized based the core belief or conviction that conventional school-aged vaccination confers herd immunity and protects against harmful communicable disease. Activist parents seeking NMEs for their school-aged children can be thought of as belonging to another distinct subgroup with a unique social identity based on the conviction that conventional school-aged vaccination poses an even greater risk than the communicable diseases targeted by the vaccinations themselves. In contrast, agnostic parents can be thought of as being unaffiliated with a unique vaccination-related subgroup identity. As such, these parents would not be expected to consider vaccination for their school-aged children until prompted to think about it by an external stimulus unrelated to subgroup self-categorization. Hornsey and Hogg support this notion that social identity theory is applicable to a wide diversity of subgroup types, ranging from distinct ethnic subgroups (in national contexts) to distinct work subgroups (in organizational settings) [39].

Individuals self-organize themselves into distinctive social categories to reduce uncertainty, find meaning, and promote a positive self-image [38][39]. Social categories generate meaning and reduce uncertainty for in-group members by establishing the boundary conditions (relative to other people) necessary for formulating unambiguous self-definitions and for adopting clear standards of behavior; social categories also provide guidance for in-group members about how out-group members are expected to behave [38][39]. In addition, social categories function to enhance the self-image of in-group members through a comparatively evaluative process with out-group members:

> It is assumed that people have a basic need to see themselves in a positive light in relation to relevant others (i.e., to have an evaluatively positive self-concept), and that self-enhancement can be achieved in groups by making comparisons between the in-group and relevant out-groups in ways that favor the in-group

(but see Hogg and Abrams 1993) [38, p. 260].

This drive to achieve and maintain "an evaluatively positive self-concept" through group affiliation can lead to intergroup competition (and even to intergroup conflict?) depending on the underlying "social beliefs" that form the basis of intergroup competition [38][39]. For example, according to Hogg et al., if out-group members believe that perceived differences in status between their out-group and a relevant in-group are legitimate, and that it is possible for out-group members to gain entry into the in-group, then the likelihood of intragroup expressions of solidarity and subsequent intergroup competition is diminished [38]. However (according to Hogg et al.), if out-group members reject the perceptions of lower status ascribed to their group, do not perceive transferring between groups as a possible (or desirable) option, and believe in the possibility of overturning "the existing social order," then the likelihood of intragroup expressions of solidarity and subsequent intergroup competition is increased [38]. The latter condition applies to the current situation of activist parents who tend to: 1. Reject notions that unfavorable beliefs about school-aged vaccination should result in stigmatization or loss of status, 2. Express no, or a limited degree of, desire to reunify with public health professionals around an affirmative approach to school-aged vaccination, and 3. Seek legitimization of vaccine delay and/or refusal in the public consciousness.

Mummendey and Wenzel further explicate the conditions that result in two subgroups entering into competition or conflict. First, members of two subgroups must share membership in a common third category, at the superordinate level, based on a common definitional element central to the identity of both groups (so a basis of comparative evaluation can be established). In addition, members of the two subgroups must differ in their unique

prototypical representations of the common definitional element in the common (superordinate) category. Finally, as a consequence of the first two conditions, members of the two subgroups must be motivated to enter into a competition, to establish their own unique group prototype as the dominant prototype that defines the superordinate common identity category. More simply put, the two subgroups compete to capture the superordinate category in a manner that represents their unique subgroup identity [40].

> Perceiving a conflict [social discrimination, in this case] requires first the social categorization into ingroup and outgroup, then, as stressed here, their discrepant mutual evaluations that may be based on discrepant social categorical understandings of the evaluative context. Negative interdependence consists therefore of a perceived inclusion of ingroup and outgroup in a superordinate category that is ethnocentrically construed by either group [40, p. 171].

By analogy, the evaluative context for public health professionals promoting vaccination and activist parents delaying and/or refusing vaccination is membership in a common superordinate identity category, conceptualized in this case as "Arbiters of School-aged Vaccination Benefits and Risks," that sits above and joins together the individual subgroup identity categories. It is against this evaluative backdrop that public health professionals and activist parents compete to establish their prototypical representations (that is, "High Benefit/Low Risk of Vaccination" for the in-group v. "Low Benefit/High Risk of Vaccination" for the outgroup) of the shared definitional characteristic (general risks and benefits of vaccination) as the dominant prototype of the common identity category. The public contest between public health officials and activist parents to establish their distinctive subgroup prototype as the dominant prototype of the superordinate category is apparent in the online communities populated by parents expressing their fears and doubts about school-aged vaccination and the public health campaigns championing the virtues of school-aged vaccinations organized by public health

professionals that are designed to counter the persuasive messaging of the online anti-vaxxer movement.

Requiring parents seeking NMEs for their school-aged children in Michigan to first attend an educational session at their local health department was originally conceived as a well-intentioned effort to convert activist parents into conformist (vaccine-accepting) parents by educating them about the risks of vaccine-preventable disease and the relative benefits and safety of school-aged vaccination. When applying the basic principles of social identity theory to this specific interaction between public health professionals and parents, a new perspective begins to emerge. In this perspective, public health professionals represent a dominant in-group attempting to falsify the vaccination-related beliefs of activist parents. The activist parents themselves represent a relevant out-group who experience this falsification attempt as a social identity threat and thereby respond defensively through an intensification of their commitment to a vaccine-delaying and/or vaccine-refusing defined (in-group) social identity. The well-meaning effort by public health professionals to falsify the vaccination-related beliefs of exempting parents and the social identity threat it engenders in these parents may inadvertently undermine intergroup harmony by increasing levels of intergroup bias and decreasing levels of intergroup trust (which can compromise the original goal of increased vaccination).

Consistent with social identity theory (and notions of social categorization), social identity threat brought about by an in-group and the subsequent expected defensive reaction exhibited by the out-group would likely emerge from a 2-phase process in this reimagined hypothetical health encounter between public health professionals and activist parents. In the

first phase, public health professionals representing the in-group would first project their unique prototype subgroup definition, “High Benefit/Low Risk of Vaccination,” on the shared (inclusive of both subgroups) superordinate category, “Arbiters of Vaccination Benefits and Risks,” and then utilize this common superordinate category, now dominated by the “High Benefit/Low Risk of Vaccination” prototype, as the prototypical norm to evaluate the outgroup (with the “Low Benefit/High Risk of Vaccination” prototype).

> In correlation studies, Wenzel, Mummendey, Weber, and Waldzus (in press) have found evidence for ingroup projection in different intergroup contexts. Perceived ingroup prototypicality and positive attitudes toward the outgroup were negatively correlated in these studies. Wenzel et al. (Study 3) also found experimental evidence for the use of the superordinate category as the basis for outgroup evaluation. These studies thus yielded evidence for ingroup projection as a predictor of outgroup evaluation [41, p. 32].

The above evidence that an in-group can first project its own unique prototypical representation onto a shared superordinate category and then utilize the shared identity category prototype as the basis to negatively evaluate the outgroup (or the prototype of the outgroup, to be more precise) is consistent with the notion that public health officials in a hypothetical health encounter can inadvertently project their unique group prototype onto the common superordinate identity category (shared with activist parents) and then utilize the projected in-group prototype as the normative standard to negatively evaluate and justify attempts to falsify the prototypical representation of the parent subgroup (“Low Benefit/High Risk of Vaccination”).

In the second step of this hypothetical health encounter, activist parents can experience the attempt to replace their original unique prototypical subgroup representation with the ingroup’s prototypical representation, “High Benefit/Low Risk of Vaccination,” as social identity threat and can defensively respond to this threat by seeking to protect their unique subgroup

identity. Hornsey and Hogg argue that intergroup relations following social identity theory turn on the maintenance of "positive inter-group distinctiveness" [39] and that threats to the positive distinctiveness of a subgroup (that is, social identity threat) can result in the subgroup retrenching its commitment to the unique belief structure that set it apart in the first place:

> We argue that threat to identity may be a very basic cause of subgroup conflict within a superordinate context [as in a context where a dominant in-group and out-group are present?]. Social identity threat provokes behaviors aimed at protecting and enhancing social identity. Social identity is threatened if there if there is a possibility of a loss of status, or an absence of the possibility to improve low status, or if there is self-conceptual and social uncertainty hinging on indistinct intergroup boundaries, low entitativity, or a poorly defined and unclear in-group prototype. Perceived threat accentuates subgroup solidarity, sharpens intergroup boundaries, accentuates ethnocentric attitudes and behaviors, inhibits superordinate group identification, and provides a more focused and polarized in-group prototype that renders the subgroup more orthodox with a more hierarchical leadership and power structure [39, p. 145].

In the hypothesized health encounter, activist parents can experience attempts to falsify the prototypical basis of their subgroup social identity as a status-losing proposition (with no option being available to elevate their status while preserving their unique social identity). In this situation facing a loss of status in the health encounter, activist parents can respond by protecting the positive distinctiveness of their original subgroup identity through increasing "subgroup solidarity" and fortifying "intergroup boundaries." This tendency to close ranks around the "Low Benefit/High Risk of Vaccination" prototype theoretically can lead activist parents into actually intensifying their unfavorable predispositions toward school-aged vaccination.

Alabastro et al. note that subgroups experiencing identity threat respond by accentuating in-group definitional features to maintain a positive self-identity: "With threats to subgroup distinctiveness, people will strive to maximize intergroup distinctions while

assimilating to their subgroup (vs. the superordinate group), which also provides a positive social identity" [42, p. 60]. Derks et al. report experimental evidence that a stigmatized group placed higher value on an in-group dimension when the in-group anticipated interacting with a perceived higher status outgroup valuing an outgroup dimension (an experimental condition mimicking social identity threat), compared to when the in-group anticipated interacting with other intra-group members valuing the in-group dimension [43]. Huo and Molina note that the formation of a superordinate common identity that fails to simultaneously recognize subgroup distinctiveness can function as a kind of identity threat (that is, a threat to subgroup distinctiveness):

> Following the logic of the Mutual Intergroup Differentiation Model (MIDM; Hewstone & Brown, 1986), Hornsey and Hogg (2000b) suggest that a sole focus on the common identity poses a form of identity threat to individuals. They argue that when a subgroup identity is a core component of the self, as in the case with ethnic identity, efforts to replace it with a common identity create a distinctiveness threat to which individuals respond by reasserting the threatened identity (see also Brewer, 1991). In other words, an emphasis on the common identity can have a boomerang effect—motivating a desire to defend the neglected subgroup and thus highlighting the very group differences the strategy was intended to attenuate [62, p. 360].

Complementary to this notion that exclusive focus on establishing a common identity without regard for acknowledging subgroup distinctiveness can trigger a defensive reaction by subgroups to blunt the effects of social identity threat, Huo and Molina report evidence that when a common "American" identity is perceived to afford greater levels of respect to ethnicity-defined subgroups by members of the subgroups themselves, members of the African American and Latino subgroups (representing the "outgroups" in this case) tend to exhibit significantly reduced levels of in-group favoritism, while members of the white subgroup (representing the "ingroup" in this case) tend to exhibit non-significantly higher levels of in-

group favoritism [62]. Reduced in-group favoritism in the presence of perceptions of subgroup respect (relative to the inclusive superordinate identity category) among African Americans and Latinos is consistent with the absence of social identity threat that would otherwise likely provoke a defensive reaction and increase subgroup (in-group) favoritism.

Huo et al. report experimental evidence that protection against social identity threat brought about by the establishment of a common shared identity without simultaneous acknowledgement of a distinctive subgroup identity can result in decreased motivation among subgroup members to observe differences in fairness of treatment exercised by institutional authorities when issuing negative work-related performance evaluations of subgroup members [63]. That is, objective differences between fair and unfair treatment by institutional authorities issuing critical performance evaluations (of a task completion exercise) do not appear to matter to individuals grouped into the experimental shared common identity condition where social identity is threatened because distinctive subgroup identity is ignored. Objective differences between fair and unfair treatment by institutional authorities issuing critical performance evaluations (of a task completion exercise) do appear to matter to individuals grouped in the experimental dual identity condition where social identity is not threatened because distinctive subgroup identity is acknowledged (in addition to the simultaneous acknowledgment of a shared common identity) [63]. In the absence of social identity threat, individuals grouped in the dual identity condition appear to accept negative performance feedback when treatment is objectively fair and appear to reject negative performance feedback when treatment is objectively unfair. In contrast, members of the

subgroup experiencing identity threat appear not to be motivated to recognize objective differences in fairness of treatment [63].

> Drawing from the work on identity devaluation, we suggest that a dual identity strategy is effective in motivating concerns about treatment quality because it demonstrates respect for a valued subgroup identity and thus helps to build a bridge of trust between the individual and the institutional authority (Cohen & Steele, 2002; Huo and Molina, submitted). When a valued identity is acknowledged, individuals may be more likely to view the relevant institution and its representatives as trustworthy and the identity relevant feedback they offer as legitimate and worth considering. When the institution blatantly neglects an important aspect of the self, individuals may respond by shifting their focus away from potential future attacks on the self that may be communicated through the actions of institutional authorities [63, 252].

In the above passage, Huo et al. establish an explicit link between a subgroup's willingness to trust an institution, including the feedback it provides, and the institution's capacity to acknowledge subgroup distinctiveness. The absence of such acknowledgement by an institution can result in social identity threat. The distrust that results from this threat can motivate members of the impacted subgroup to retreat from the institution and distance themselves from institutional feedback to ensure protection of subgroup distinctiveness.

Translating Social Identity Theory and Its Corollaries into an Epidemiological Context

When social identity theory and related notions of social categorization and social identity threat are applied in a new way to conceptualizing the mandatory waiver educational session that activist parents are required to attend in Michigan prior to filing NMEs, it becomes clear that, for these parents, subgroup identification and membership hypothetically provides the:

1. Social encouragement and intragroup solidarity necessary to maintain a strong affiliation with the subgroup prototype, "Low Benefit/High Risk of Vaccination," when

provoked to consider the benefits and risks of vaccination (e.g., during a required waiver educational session at a LHD), and

2. Social support necessary to maintain and enhance the strength of affiliation to the subgroup prototype when encountering attempts from a relevant in-group authority (e.g., public health professionals) to falsify and replace the existing subgroup prototype with the new prototype, "High Benefit/Low Risk of Vaccination."

In contrast, social encouragement and social support hypothetically are less salient (meaningful) to agnostic parents because the social identity of these parents is not associated with (or exists outside of) the inclusive shared superordinate identity category, "Arbiters of Vaccination Benefits and Risks." For these parents, their subgroup identity is also not associated with (or exists outside of) any subgroup identity defined by a vaccination-related prototype ("High Benefit/Low Risk or Low Benefit/High Risk of Vaccination") – at least until the time when school-entry immunization requirements or the prospect of mandatory attendance at an educational session knock these parents "off the fence" by removing the convenience associated with remaining uncategorized and provoking them to accept at least temporary membership in and identification with the shared superordinate category and the unique subgroup characterized by the "High Benefit/Low Risk of Vaccination" prototype. Epidemiological investigation can help assess these hypothesized differences in levels of social encouragement and social support between the agnostic and activist parent subgroups.

Public Health Implications of Enhanced Classification of Vaccination-Related Parent Subgroups

The potential public health implications of enhancing classification of agnostic and activist parents through integration of Peretti-Watel et al.'s healthism/trust vaccine-hesitancy

theoretical framework and social identity theory and its corollaries, including social identity threat, are considerable. Enhanced classification potentially allows public health practitioners to:

1. Understand why 2015 MDHHS administrative rule change governing NME filing procedures may work for agnostic parents, but not for activist parents;
2. Understand why activist parents may experience social identity threat during mandatory waiver education sessions and respond defensively by intensifying their commitment to a subgroup identity opposed to school-aged vaccination;
3. Identify activist parents not likely to benefit from current LHD waiver education prior to service delivery, and avoid potentially further alienating these parents and wasting valuable resources (by avoiding ineffectual education);
4. Modify required LHD waiver education to meet the social identity needs of activist parents by:
    a. Acknowledging the successes of these parents in promoting generally healthy lifestyles (diet, exercise, and screen usage) for their school-aged children as an approach to indirectly affirm their unique subgroup identity without endorsing their unfavorable beliefs about vaccination, and
    b. Offering these parents membership in a more inclusively redefined superordinate identity category that includes members of the conventional public health community, based on increased mutual understanding and respect, as an approach to increase intergroup harmony, reduce intergroup bias, and promote intergroup trust;

5. Maintain required LHD education as a nudge (that is, something to be avoided) to motivate agnostic parents to comply with school-entry immunization requirements through vaccination of their school-aged children.

Research assessing hypothesized differences in healthism and trust levels, as well as in sensitivity to social encouragement and social support, between agnostic and activist parent subgroups was carried out at LHDs in northern lower Michigan that provide vaccination-related services to parents responsible for the vaccination status of their school-aged children in three counties with a recent history of elevated NME rates.

Chapter 4: Study Methods

Major Study Assumptions

At its outset, this study assumes the following about parent behavior in response to school-entry immunization requirements:

1. Parents who wait to fully vaccinate their child entering 7th grade until the late summer (late July-early September) period prior to start of the school year, or until after the actual start of the school-year (up until October 14th), after receiving notification of under-vaccination from the Michigan Immunization Care Registry and/or receiving a reminder of school-entry immunization requirements from their local school district in the months leading up to the start of the school year, are accurately characterized by their actual behavior as agnostics, and
2. Parents who wait to file NMEs for their child entering 7th grade until the late July, August, or early September period prior to start of the school year, or until after the actual school-year begins (up until October 14th), after receiving notification of under-vaccination from the Michigan Immunization Care Registry and/or receiving a reminder of school-entry immunization requirements from their local school district in the months leading up to the start of the school year, are accurately characterized by their actual behavior as activists.

These categories and the underlying assumptions are assumed to be valid for the methods described in this chapter. Please note that the results of this study call into question the validity of the first assumption, while supporting the validity of the second assumption (please see discussion section for additional details).

Primary Research Questions

Research Question 1:

In Michigan, is it possible to accurately classify activist and agnostic parents with an assessment tool based on measuring levels of parent-expressed healthism (heath self-advocacy) and trust (in conventional medical/health authorities)?

Research Question 2:

Do key intermediate health metrics/behaviors of school-aged children not related to vaccination status (e.g., BMI, healthy diet, physical activity, sleep habits, screen time utilization, Family Nutrition and Physical Activity (FNPA) Survey score) differ in Michigan between school-aged children whose parents are classified as activists or agnostics?

Research Question 3:

A. In Michigan, are parents classified as agnostics more likely to respond in agreement with policy-level nudges (i.e., more complex exemption filing procedures), compared to parents classified as activists?
B. In Michigan, are parents classified as activists more likely to respond in agreement with interventions sensitive to loss of social encouragement or support when hypothetically considering vaccination or changes in vaccination behavior, compared to parents classified as agnostics?

Research Aims and Aim-Specific Hypotheses

Aim 1:

Building on the work of Peretti-Watel et al. (based on levels of healthism and trust expression) to accurately classify parents responsible for the vaccination status of their child enrolled in 7th grade in northern Michigan as:

1. Agnostics,
2. Activists.

Hypothesis 1 (for Aim 1):

Parents can be sorted into classifications of agnostics and activists based on responses to a screening tool (thereby predicting parent vaccination or NME behavior), and the reliability of this screening instrument can be demonstrated by calculating agreement between predicted classifications of parents and observed behaviors of parents responding to school-entry immunization requirements (the gold standard).

Aim 2:

To compare group variation in health metrics/behaviors of 7th grade children between those with agnostic and activist parents.

Hypothesis 1 (for Aim 2):

School-aged children of agnostic parents exhibit compromised health behaviors and outcomes, compared to school-aged children of activist parents, including:

- Children with activist parents exhibit healthier BMIs, healthier Family Nutrition and Physical Activity (FNPA) Survey scores (which predict childhood obesity), and healthier FNPA sub-category scores (e.g., physical activity), compared to children with agnostic parents.

- Children with activist parents exhibit higher prevalence of healthy behaviors on individual categories of the FNPA survey (e.g., sugary beverage consumption), compared to children with agnostic parents.

Aim 3:

Building on social identity theory and its corollaries, assess the comparable sensitivity of parents presumptively classified as activists and parents presumptively classified as agnostics to nudge-based policy interventions. In addition, assess comparable sensitivity of parents classified as agnostics and parents classified as activists to interventions entailing a possible loss of social encouragement and support, including loss of peer group support, when asked to consider vaccination or changes in vaccination behavior.

Hypothesis 1 (for Aim 3):

Parents classified as agnostics exhibit stronger agreement with policy-level interventions, compared to parents classified as activists. Parents classified as activists exhibit greater agreement about the value of social encouragement and concern over the potential loss of social support when considering vaccination or a change in vaccination behavior, compared to parents classified as agnostics.

Secondary Research Questions

Secondary Research Question 1:

Does healthism confound the relationship between NME education and NME filing? In other words, does healthism create a spurious (false) relationship between education and NME filing, or does healthism attenuate the strength of association between education and NME filing?

Secondary Research Question 2:

Do activist parents hypothetically affiliated with a strong subgroup identity exhibit stronger identification with a vaccine-hesitant prototype (that is, are they more skeptical about vaccine safety and efficacy?), compared to agnostic parents hypothetically unaffiliated with a strong subgroup identity?

Secondary Research Aim and Aim-Specific Hypothesis

Secondary Aim 1A:

Assess whether the statistically significant association frequently reported in the literature between educational level and NME-filing is spuriously created by healthism (as a confounder) or attenuated by healthism (as a confounder).

Secondary Aim 2A:

Assess whether activist parents exhibit greater degrees of vaccine hesitancy, compared to agnostic parents.

Hypothesis 1A (for Secondary Aim 1A):

The previously reported statistically significant association between education level and NME filing is spuriously caused or attenuated by healthism; healthism accounts for (or predicts) the variation in NME filing, not solely education level.

Hypothesis 2A (for Secondary Aim 2A):

Activist parents hypothetically affiliated with a strong subgroup identity exhibit greater fidelity to a vaccine-hesitancy prototype, compared to agnostic parents hypothetically unaffiliated with a strong subgroup identity.

Methods

Study Power

Basic study power calculations were carried out for the parametric testing (utilizing OpenEpi, Version 3, Open Source Calculator) and the non-parametric testing (utilizing G*Plot). For the parametric testing, the sample size calculation yielded a minimum sample size requirement of 60 to detect a difference in BMI as small as 2.5 units between children (entering 7^{th} grade) of agnostic and activist parents at a power level of approximately 80%. For the parametric testing, the sample size calculation yielded a minimum sample size requirement of 60 to detect a difference on the healthism scale as small as 1 unit between agnostic and activist parents at a power level of approximately 95%.

Define Target Population and Study Population

The **target population** is comprised of: 1. Agnostic and activist parents who send their children to predominantly public schools in states in the U.S. that allow NMEs, and 2. Children of these parents who predominantly attend public school in states in the U.S. that allow NMEs. The generally small proportion of students attending school under a medical exemption (ME), and the parents of these students, in states in the U.S. that allow NMEs, are not included as part of the target population in this study.

The **study population** is comprised of parents and their children regularly attending 7th grade in Benzie, Leelanau, and Grand Traverse counties in northern lower Michigan with high rates of NMEs (historical and current) and where students (K-8) mainly attend public school (81-86%) [64]. Michigan statute requires all kindergartners and 7th graders to comply with school-entry vaccination requirements or to attend school under NMEs filed by their parents prior to entry

into kindergarten or 7th grade. 7th graders and their parents are selected as the population of interest in this study, as 7th graders are thought likely to exhibit greater variation in non-vaccination related health outcomes (BMI, physical activity, diet, screen utilization) as a function of their older age, compared to younger kindergartners.

Define Sampling Frame, Recruitment Plan, Study Sample, and Sampling Method

The **sampling frame** includes parents and their children entering 7th grade who utilize LHD services at the Grand Traverse County Health Department or the Benzie Leelanau District Health Department between July 29, 2019 and October 14, 2019 to comply with school-entry immunization requirements for the 2019-2020 school year, either through vaccination or NME filing (following mandatory waiver education).

Study Recruitment

The **recruitment plan** called for enrolling 60 parents who utilized vaccination-related services at the participating HDs. Recruiting 60 parents appeared to be a realistic goal based on the vaccination service utilization records of the participating HDs from the previous year. HD staff invited parents who utilized vaccination-related services to complete the survey, but not all parents were offered an opportunity to complete the survey. The goal of enrolling 60 parents could not be reached, even after the original data collection deadline was extended by approximately 2 weeks to 14 October 2019 (after which time most parents reached compliance with school-entry immunization requirements and ceased utilizing vaccination-related services at the participating HDs).

The **study sample** is therefore a convenience sample, consisting of the first 51 parents agreeing to complete the survey after providing informed consent and their 51 respective children (N=102). The sample population is comprised of the following:

1. 26 parents who utilize LHD services to fully vaccinate their children entering 7th grade for the 2019-2020 school year in compliance with school-entry immunization requirements;
2. 25 parents who utilize LHD services to file NMEs for their children entering 7th grade for the 2019-2020 school year in compliance with school-entry immunization requirements;
3. 26 school-aged children* of the above 26 parents utilizing LHD services to fully vaccinate their children entering 7th grade; and
4. 25 school-aged children* of the above 25 parents utilizing LHD services to file NMEs their children entering 7th grade.

(*Although 51 children entering 7th grade are included in the sample, they were not surveyed). The utilization of a **convenience sampling method** likely introduced selection bias, as the parents who completed the survey may be selectively different from the parents who comprise the target population. Efforts were made to measure non-response rates, but non-response rates could not be assessed consistently across all participating health departments. The proportion of parents electing to file NMES for their child entering 7th grade who completed the survey and the proportion of parents electing to fully vaccinate their child entering 7th grade who completed the survey are not known and may be small. Reliance on convenience sampling is a major limitation of this study because it casts doubt on the sample's representativeness of the target population.

Additional selection bias may have been introduced through other means. That is, agnostic parents who ultimately elect to fully vaccinate their school-aged children at their LHD within the designated data collection time-interval (covering approximately the 6 weeks prior to the start of the school year and the first 4 weeks of the school year) may be selectively different from the agnostic parents who ultimately elect to fully vaccinate their school-aged children at the pediatrician's office within the designated time-interval; agnostic parents who ultimately elect to fully vaccinate their school-aged children at their LHD within the designated time-interval may be selectively different from agnostic parents who ultimately elect to vaccinate their school-aged children at their LHD outside the designated time-interval; activist parents who file NMEs for their school-aged children within the designated time-interval may be selectively different from the activist parents who file NMEs for their school-aged children outside the designated time-interval; and agnostic and activist parents who utilize vaccination-related services at their LHD for their children entering 7th grade may be selectively different from agnostic and activist parents who utilize vaccination-related services at their LHD for their children entering kindergarten.

Define Study Design

Cross-sectional study design, including one-time:

- Parent self-reported survey of healthism and trust measures, parent self-reported sensitivity to convenience measures and to social support loss measures, and parent self-reported demographic characteristics.
- Parent self-reported survey of children's height, weight, physical activity, diet, and screen utilization, plus parent self-reported children's demographic characteristics.

Questionnaire Format

The survey collected the following general demographic information:

- Age of parent (self-report)
- Gender identity of parent, including option to choose non-binary (self-report)
- Educational attainment of parent (parent self-report)
- Family income (parent self-report)
- Ethnicity of parent (self-report)
- Age of child (parental report)
- Gender identity of child, including option to choose non-binary (parental report)
- Ethnicity of child (parental report)

The following main outcome variables were also collected by parent self-report:

- Healthism and healthism-related measures
- Trust in conventional medical/authorities
- Height and weight of child (to calculate child BMI)
- FNPA survey scores (also utilized to calculate FNPA sub-scores; e.g., fruit and vegetable consumption, physical activity, screen utilization, etc.)
- Sensitivity measure 1 (to policies or procedures that make NME filing or vaccine refusal more inconvenient)
- Sensitivity measure 2 (to policies or procedures that make NME filing or vaccine refusal more inconvenient)
- Sensitivity measure 3 (to policies or procedures that make NME filing or vaccine refusal more inconvenient)

- Sensitivity measure 4 (to loss of social encouragement attending hypothetical change in parental vaccination belief)
- Sensitivity measure 5 (to loss of social support attending hypothetical change in parental vaccination behavior)

The following main exposure (explanatory) variable was collected by parent self-report:

- Parent subgroup membership (fully vaccinating or NME filing – both in compliance with school-entry immunization requirements)

  NOTE: This main exposure variable could not be consistently verified by LHD staff. As a result, exposure misclassification is possible. In addition, in one instance where verification occurred, LHD staff noted a discrepancy in self-reported exposure; this exposure was recorded according to the HD verification.

The following variables are identified potential confounding variables, due to their correlation with the main exposure measure (group membership) and multiple outcomes:

- Parent gender
- Parent income
- Parent education

Parent group membership is also treated as an outcome variable in secondary data analysis testing the hypothesized confounding effect of healthism on the education (explanatory variable) – parent vaccination-related behavior (outcome variable) relationship

Statistical Approach

To test Hypothesis 1, the reliability of the assessment tool to accurately classify parents of school-aged children into subgroups of agnostics and activists and to thereby predict actual parent vaccination or NME behavior, the following statistical method was utilized:

1. Ascertain healthism (health self-advocacy) and trust (in medical authorities) on scale from 1 to 10 from parent self-report.
2. Define a positive test for agnostics as: a low score on the healthism scale (1=<healthism<=5) and a low score on the trust scale (1=<trust<=5).

   Define a negative test for agnostics as: a low score on healthism scale (1=<healthism<=5) and high score on trust scale (6=<trust<=10) [a positive test for conformists] OR high score on healthism scale (6=<healthism<=10) and high score on trust scale (6=<trust<=10) [a positive test for investigators] OR high score on healthism scale (6=<healthism<=10) and low score on trust scale (1=<trust<=5) [a positive test for activists]
3. Define a positive test for activists as: a high score on the healthism scale (6=<healthism<=10) and a low score on the trust scale (1=<trust<=5).

   Define a negative test for activists as: high score on healthism scale (6=<healthism<=10) and high score on trust scale (6=<trust<=10) [a positive test for investigators] OR low score on healthism scale (1=<healthism<=5) and high score on trust scale (6=<trust<=10) [a positive test for conformists] OR low score on the healthism scale (1=<healthism<=5) and a low score on the trust scale (1=<trust<=5) [a positive test for agnostics].
4. Ascertain actual full vaccination or NME parent behavior from parent self-report with LHD verification (when possible).

5. Create Contingency Table 1 to calculate Sensitivity (Sen), Specificity (Spec), Positive Predictive Value (PPV), and Negative Predictive Value (NPV) for test of agnostic parents.
6. From Contingency Table 1, calculate Sen=T+lD+, Spec=T-lD-, PPV=D+lT+, NPV=D-lT, whereas D+ = actual compliance (full vaccination) and D- = actual refusal (NME); and whereas T+ = positive test and T- = negative test.
7. Create Contingency Table 2 to calculate Sen, Spec, PPV, and NPV for test of activists, whereas D+ = actual refusal (NME) and D- = actual compliance (full vaccination); and whereas T+ = positive test and T- = negative test.
8. From Contingency Table 2, calculate Sen=T+lD+, Spec=T-lD-, PPV=D+lT+, NPV=D-lT, whereas D+ = actual refusal (NME) and D- = actual compliance.
9. Conduct univariate linear regression with parent subgroup membership (full vaccination vs. NME filing) as explanatory variable and healthism as outcome variable.
10. Conduct univariate linear regression with parent subgroup membership (full vaccination vs. NME filing) as explanatory variable and trust as outcome variable.

To test Hypothesis 2, that school-aged children of agnostic parents exhibit poorer general health outcomes, compared to school-aged children of activist parents, the following statistical methods were utilized:

1. Ascertain height and weight for children from parent self-report and calculate children's BMI.
2. Ascertain FNPA survey score from parent self-report.
3. Ascertain FNPA healthy eating sub-score from parent self-report.
4. Ascertain FNPA physical activity sub-score from parent self-report,

5. Ascertain FNPA-labeled subcategory scores (e.g., “Family Eating Practices”) from parent self-report.
6. Provide null and alternative hypotheses for testing mean difference between above two groups for children’s BMI, FNPA survey score, FNPA healthy eating sub-score, FNPA physical activity sub-score, and FNPA-labeled subcategory scores: Ho: U1 – U2 = 0; Ha: U1 – U2 not equal to 0.
7. Test equality of variance assumption: S1(squared)/S2(squared).
8. Test each hypothesis with T-test, given two independent samples with a continuous variable.
9. Conduct non-parametric sensitivity testing (Mann-Whitney Test) to check consistency with parametric testing results.

To test Hypothesis 3, that parents classified as agnostics exhibit stronger agreement with policy-level nudges (e.g., more complex NME filing procedures), compared to parents classified as activists, and parents classified as activists exhibit greater agreement about the importance of social support when considering a hypothetical change in vaccination behavior, compared to parents classified as agnostics, the following statistical methods were utilized:

1. Ascertain policy sensitivity measure 1 on scale from 1 to 10 from parent self-report: “Knowing that parents are required to attend an educational session at the health department before a vaccination waiver can be obtained motivates me to get shots for my child.”

2. Ascertain policy sensitivity measure 2 on scale from 1 to 10 from parent self-report: "Knowing that my child can be sent home for multiple days during a disease outbreak if he or she doesn't get shots motivates me to get shots for my child."
3. Ascertain social support sensitivity measure 3 on scale from 1 to 10 from parent self-report: "Convenience plays a role in my decision-making when I consider my child's shots."
4. Ascertain social support sensitivity measure 3 on scale from 1 to 10 from parent self-report: "Encouragement from other people is important to me when I consider my child's shots."
5. Ascertain social support sensitivity measure 4 on scale from 1 to 10 from parent self-report: "I worry about losing support from or jeopardizing my relationships with people around me (including people on-line) if I change my opinion about my child's shots."
6. Provide null and alternative hypotheses for testing mean difference between above two groups for parent's sensitivity measures 1, 2, 3, and 4:
   Ho: U1 – U2 = 0; Ha: U1 – U2 not equal to zero.
7. Test equality of variance assumption: S1(squared)/S2(squared).
8. Test each hypothesis with T-test, given two independent samples with a continuous variable.
9. Conduct non-parametric sensitivity testing (Mann-Whitney Test) to check consistency with parametric testing results.
10. Conduct univariate linear regression with parent subgroup membership (vaccination vs. NME filing) as explanatory variable and sensitivity measure 1 as outcome variable.
11. Conduct univariate linear regression with parent subgroup membership (vaccination vs. NME filing) as explanatory variable and sensitivity measure 2 as outcome variable.

12. Conduct univariate linear regression with parent subgroup membership (vaccination vs. NME filing) as explanatory variable and sensitivity measure 3 as outcome variable.
13. Conduct univariate linear regression with parent subgroup membership (vaccination vs. NME filing) as explanatory variable and sensitivity measure 4 as outcome variable.
14. Conduct univariate linear regression with parent subgroup membership (vaccination vs. NME filing) as explanatory variable and sensitivity measure 5 as outcome variable.

Statistical Analyses

All unadjusted analyses and post-hoc adjusted analyses were carried out by fitting ANOVA models that involved manually creating dummy variables and utilizing the PROC REG command in SAS Version 9.4. T-tests were conducted in Excel or the Excel (statistical) add-on package known as XLSTAT 2020. Non-parametric testing was conducted in XLSTAT 2020.

Secondary Hypothesis Testing

To test potential confounding effect of healthism on the education (explanatory variable) – vaccination status relationship, the following statistical methods were used:

1. Conduct univariate logistic regression with parent vaccination/NME behavior as outcome variable and education as explanatory variable
2. Conduct multivariate logistic regression with parent vaccination/NME behavior as outcome variable and healthism and trust as explanatory variables
3. Conduct multivariate logistic regression with parent vaccination/NME behavior as outcome variable, healthism and trust as explanatory variables, and education level (as possible confounding variable)

Chapter 5: Field Study Results

The overall parent sample is predominantly white (90%), which is a risk factor for NMEs [65], and female (67%). Median education by educational category is an associate's degree, and median income by income category falls in the $35,000-49,999 income range. Parent ethnicity does not differ across the parent groups (fully vaccinating group v. the exempting) when ethnicity is dichotomized into two groups (white with no Hispanic heritage v. other ethnicity) (Table 1). In addition, there is no difference in parent education across the parent groups when levels of parent education are dichotomized (bachelor's degree or higher v. associate's degree or lower) (Table1). This lack of difference may be attributable to the relatively high levels of education among parents who utilize LHD vaccination-related services in Grand Traverse, Leelanau, and Benzie Counties in northern lower Michigan. In contrast, parent income significantly differs across the parent groups when parent income levels are dichotomized ($50,000 or higher v. $49,999 or lower) (Table 1). This significant finding is consistent with multiple studies, including those with parents of infants, young children, and elementary school-aged children, reporting higher socio-economic status (SES) as a risk factor for NMEs or vaccine refusal [65][66][67], but inconsistent with a small number of studies either reporting lower SES as a correlate to NMEs (among parents of students attending elementary school) [34] or reporting no SES difference between parent groups (exempting v. fully vaccinating) [68]. In addition, parent gender significantly differs across the parent groups when gender is dichotomized (male v. female) (Table 1).

Table 1: Sample Demographic Characteristics (Parents)

Parents			
	Fully Vaccinating Group (N=26)	Exempting Group (N=25)	P-value for Group Difference (Chi-squared for gender, education, and income; t-test for age)
Age			0.8643
Mean Age in Years	39.73	39.39	
Gender			0.0476
Female	53.85% (14)	80% (20)	
Male	46.15% (12)	20% (5)	
Non-binary	0% (0)	0% (0)	
Ethnicity			1.0000 (Fisher's exact test)
White without Hispanic, Latino, or Spanish Descent	88.46% (23)	92% (23)	
White with Hispanic, Latino, or Spanish Descent	0.0% (0)	0.0% (0)	
American Indian or Alaska Native	3.85% (1)	0.0% (0)	
Asian American	0.0% (0)	0.0% (0)	
African American	0.0% (0)	0.0% (0)	
Native Hawaiian or Pacific Islander	0.0% (0)	0.0% (0)	
Other	3.85% (1)	4% (1)	
Mixed Ethnicity	3.85% (1)	4% (1)	
Education			0.4753
Less than high school	11.5% (3)	0.0% (0)	
High school or equivalent	19.23% (5)	12.00% (3)	
Some college	26.92% (7)	28.00% (7)	
Associate Degree	19.23% (5)	28.00% (7)	

Table 1 (cont'd)

Bachelor's Degree	11.54% (3)	28.00% (7)	
Master's Degree	3.85% (1)	4.00% (1)	
Professional Degree	3.85% (1)	0.0% (0)	
Doctorate	3.85% (1)	0.0% (0)	
Income			0.0175
Less than $20,000	15.38% (4)	0.0% (0)	
$20,000 – $34,499	26.92% (7)	16.00% (4)	
$35,000-$49,999	26.92% (7)	20.00% (5)	
$50,000 - $74,999	3.85% (1)	28.00% (7)	
$75,000 - $99,999	11.54% (3)	20.00% (5)	
Over $100,000	15.38% (4)	16.00% (4)	

Age, gender, and ethnicity do not differ between the children of exempting parents and fully vaccinating parents in the children sample, based on parent self-report (Table 2).

Table 2: Sample Demographic Characteristics (Children)

Children			
	Fully Vaccinating Group (N=26)	Exempting Group (N=25)	P-value for Group Difference (Chi-squared for gender, education, and income; t-test for age)
Age			0.5704
Mean Age in Years	12.08	12.16	
Gender			0.6830
Female	57.69% (15)	52.00% (13)	
Male	43.31% (11)	48.00% (12)	
Non-binary	0% (0)	0% (0)	
Ethnicity			1.0000 (Fisher's exact test)

Table 2 (cont'd)

White without Hispanic, Latino, or Spanish Descent	84.62% (22)	88% (22)	
White with Hispanic, Latino, or Spanish Descent	0.0% (0)	0.0% (0)	
American Indian or Alaska Native	3.85% (1)	0.0% (0)	
Asian American	0.0% (0)	0.0% (0)	
African American	3.85% (1)	0.0% (0)	
Native Hawaiian or Pacific Islander	0.0% (0)	0.0% (0)	
Other	3.85% (1)	4% (1)	
Mixed Ethnicity	3.85% (1)	8% (2) Mixed Ethnicity	

Results for Hypothesis 1

This study assumes that parents who fully accept vaccination for their school-aged children after receiving a nudge to comply with school-entry immunization requirements are accurately characterized by their behavior as agnostics and that parents who oppose and/or delay vaccination for their school-aged children after receiving the same prompt are accurately characterized by their behavior as activists. This study hypothesizes that the theoretical framework developed by Peretti-Watel et al. can be utilized as a potentially valuable screening tool to reliably predict the assumed classification of agnostics and activists. That is, a low trust/low healthism decision-making profile hypothetically should predict the assumed classification of the fully vaccinating parents as agnostics, and a low trust/high healthism decision-making profile hypothetically should predict the assumed classification of the exempting parents as activists. However, comparative assessment across the fully vaccinating

and exempting parent subgroups of this study's main trust measure and main and secondary healthism measures casts doubt on the reliability of the screening test and challenges the validity of this study's main assumption that the fully vaccinating parents are reliably classified as agnostics. That is, in unadjusted analysis, the mean trust score of 8.46 for the fully vaccinating parents is significantly higher than the mean trust score of 5.44 for the exempting parents (Table 3). In non-parametric testing (Mann-Whitney Test), the difference in mean trust scores between the parent subgroups is also significant (p-value = 0.000, Two-tailed). Furthermore, in adjusted analysis, parent group membership (beta coefficient = -3.21348; p-value=0.0001) continues to explain significant variation in the main trust outcome variable (when treated as a continuous variable) after parent age, gender, education, income, and ethnicity are adjusted for (included) in the regression model. This significantly higher trust level in the fully vaccinating parent group suggests that these parents are more reliably conceptualized either as investigators and/or conformists (the two parent subgroup categories corresponding to high trust profiles). Confidence in this finding of higher trust levels in the fully vaccinating parents, compared to the exempting parents, is likely warranted, as it is consistent with multiple studies or reviews [65][34][68] and one review including 41/71 studies focused on the HPV vaccine (which is not included as part of school immunization requirements) [69]. However, it is important to also note that this study's main trust measure is based on only measuring one dimension of trust and ignores other important dimensions of trust potentially impacting the decision-making process of the fully vaccinating parents (e.g., trust in the safety and efficacy of vaccines). By considering these other dimensions of trust, it is possible that a

small number of fully vaccinating parents are reliably classified as agnostics, consistent with this study's original assumption.

Comparative assessment across parent subgroups of this study's main healthism measure and proxy measures also calls into question this study's assumption that the fully vaccinating parents are reliably classified as agnostics and truly exhibit a low trust/low healthism decision-making profile. Prior to reviewing these comparative assessments, it is important to note that:

1. Healthism is this study's main variable conceptualized to measure and distinguish levels of parental advocacy for their children's health between the fully vaccinating and exempting parents;
2. Shot belief is a secondary healthism proxy variable conceptualized to measure and distinguish levels of vaccine conviction between the fully vaccinating and exempting parents; and
3. Health as a super value is an additional (secondary) healthism proxy conceptualized to measure and distinguish levels of healthism-like commitment between the fully vaccinating and exempting parents.

The mean healthism score of 9.68 for fully vaccinating parents is slightly higher – and not significantly lower as hypothesized – than the mean healthism score of 9.56 for exempting parents (Table 3). In non-parametric testing (Mann-Whitney Test), the difference in mean healthism scores between parent subgroups is also not significant (p-value = 0.476, One-tailed). Similarly, the mean shot belief score of 8.53 for fully vaccinating parents is slightly higher – and not significantly lower as hypothesized – than the mean shot belief score of 8.23 for exempting

parents (Table 3). In non-parametric testing (Mann-Whitney Test), the difference in mean shot belief scores between parent subgroups is also not significant (p-value = 0.289, One-tailed). Therefore, no significant evidence is present that the mean healthism and shot belief (conviction) scores differ between parent groups, which suggests that the fully vaccinating parents do not match the low healthism decision-making profile corresponding to the agnostic category. However, interpretation of this healthism or healthism-related measure is not as straightforward as the interpretation of the main trust measure, as healthism is not typically assessed in other studies. In addition, in this study, the mean "health as a super value" score of 8.96 for the exempting parent group is significantly higher than the mean "health as a super value" score of 8.08 for the fully vaccinating parent group at the alpha=0.10 level for a 1-sided test, but not at the alpha=0.05 level, as originally hypothesized (Table 3). In non-parametric testing (Mann-Whitney Test), the difference in mean "health as a super value" scores between parent subgroups does not approach statistical significance at the same alpha=.010 level (p-value = 0.1375, One-tailed). The result of the parametric testing (but less so for the non-parametric testing result) suggests that the "health as a super value" construct may be a more reliable measure of healthism than the healthism or shot belief measure. If so, the possibility that the fully vaccinating parents are more reliably classified as conformists cannot be ruled out.

Table 3: Outcome Differences by Parent Group Membership for Hypothesis 1

Survey Item (Construct)	Fully Vaccinating Group (Mean Score)	Exempting Group (Mean Score)	Test Type	P(T≤t)
I trust recommendations from members of the medical community (e.g., doctors, nurses, public health officers) about my child's shots. (Trust)	8.46	5.44	Two-tail (as no difference is hypothesized)	0.000155
It is my role as a parent to actively make decisions about shots for my child. (Healthism - main)	9.68	9.56	One-tail (as higher score in exempting group, not fully vaccinating group is hypothesized, but intergroup difference is small and not significant)	0.363402
I have strong beliefs about my child's shots. (Shot belief – healthism proxy)	8.54	8.23	One-tail (as higher score in exempting group is hypothesized, but small intergroup difference is small and not significant)	0.292439
Health is the most important value to me, more important than politics, religion or economics. (Health as a super value-healthism proxy)	8.08	8.96	One-tail (as higher score in exempting group is hypothesized)	0.084046
Vaccination safely and effectively protects my child from disease. (Vaccine confidence)	8.96	3.8	One-tail (as lower score in exempting group is hypothesized)	3.82E-10

Surprisingly, with one exception, all parents electing vaccination at HD visit for their child entering 7th grade map to the investigator category, which runs counter to this study's original

hypothesis that this subgroup of parents map to the agnostic category (Figure 8). The x-axis in figure 8 plots this study's main trust measure ("*I trust recommendations from members of the medical community (e.g., doctors, nurses, public health officers) about my child's shots"* for each respondent's score*;* and the y-axis plots this study's main healthism measure *("It is my role as a parent to actively make decisions about shots for my child")* for each respondent's score.

Figure 3: Sensitivity and Specificity Plot (TP=True Positive, FN=False Negative, TN=True Negative, FP=False Positive are relative to activist parents only) Based on Singular Measure of Trust in Conventional Medical/Health Authorities

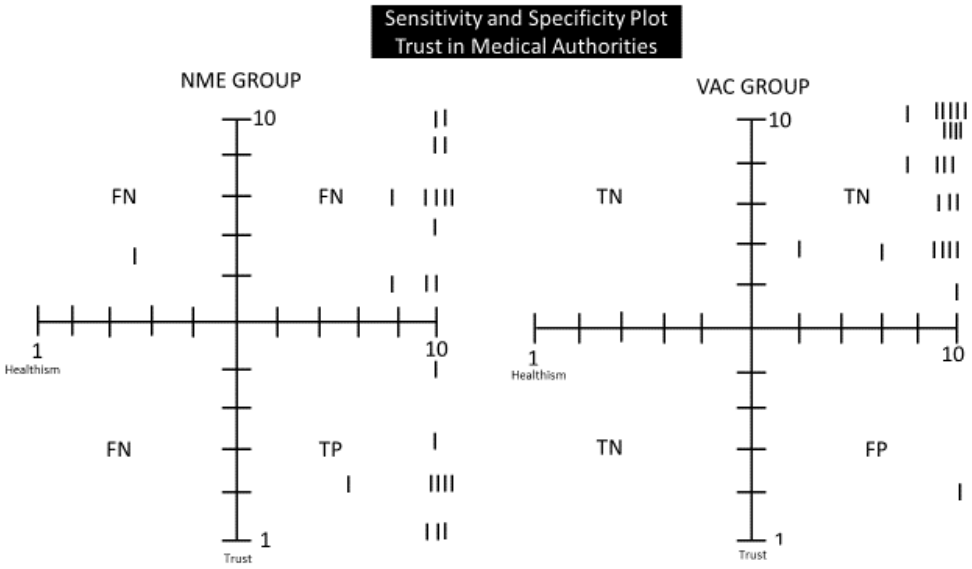


Table 4: Sensitivity and Specificity Calculation Based on Healthism and Trust in Conventional Medical/Health Authorities

	D+ = NME+		D- = NME-		
T+	10	TP	1	FP	11
T-	14	FN	24	TN	38
	24		25		

Sensitivity = 10/24 = 42%
Specificity = 24/25 = 96%

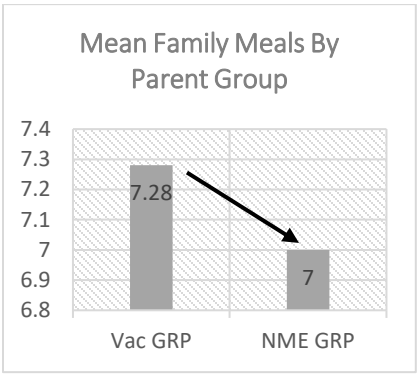
The original hypothesis conceptualized these parents as agnostics, but the high healthism score of these parents may indicate a problem with the healthism measure or may indicate the ubiquitous presence of healthism in the greater Traverse City tri-county region. As a result, the sensitivity of the diagnostic test for fully vaccinating parents is zero (no plot or table shown), making it unsuitable for use in LHDs as a reliable predictor of parent subgroup classification. In addition, also surprisingly, 13/24 or 54% of parents electing to file NMEs for their child entering 7th grade with high healthism scores also exhibit high trust scores in conventional medical authorities. As a result of these seemingly paradoxically high trust levels and the problematic or non-informative healthism measure in exempting parents, the low sensitivity of the diagnostic test for exempting parents, 42% (see above table), also makes it unsuitable for use in local health department as a reliable predictor of parent subgroup classification (see Discussion Section for further elaboration and explanation of post-hoc approach improving accuracy of diagnostic test for exempting parents).

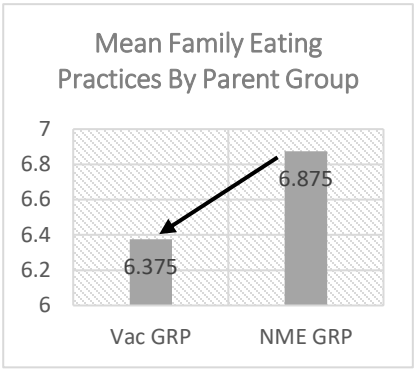
Results for Hypothesis 2

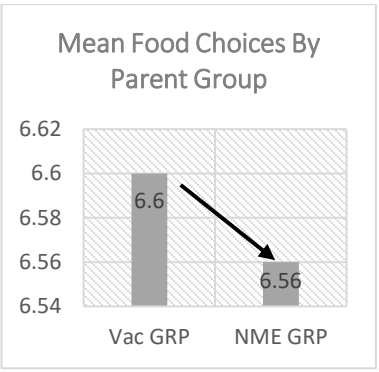
To readily visualize descriptive trends in the Family Nutrition and Physical Activity (FNPA) Survey data, families with parents electing to file NMEs at HD visit for their child entering 7th grade, compared to families with parents electing full vaccination for their child entering 7th grade, exhibit:

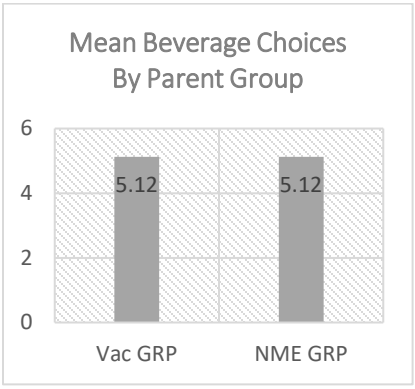
1. Higher mean scores in 7 of 10 subcategories labeled in the FNPA (Figure 4),
2. Lower mean scores in 2 of 10 subcategories labeled in the FNPA (Figure 4),
3. Same mean score in the FNPA subcategory labeled “Beverage Choices” (Figure 4).

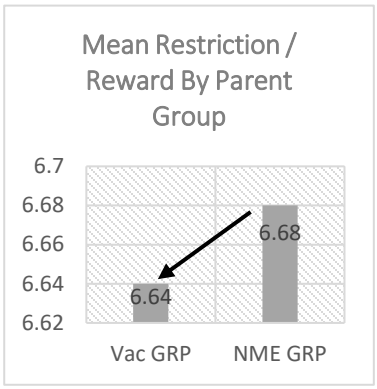
Figure 4: Mean Parent Group Comparisons Across All 10 FNPA Survey-Labeled Categories

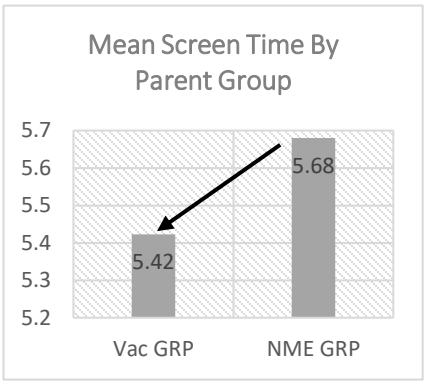


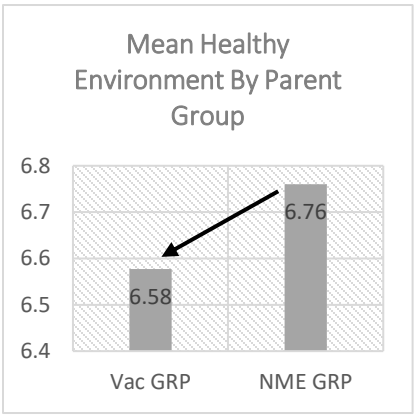


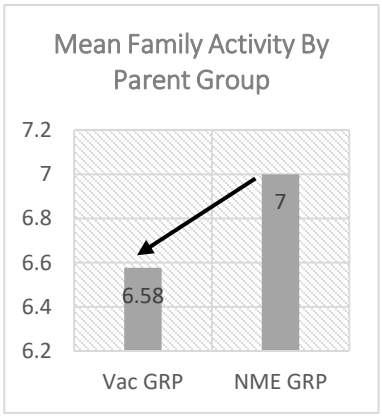


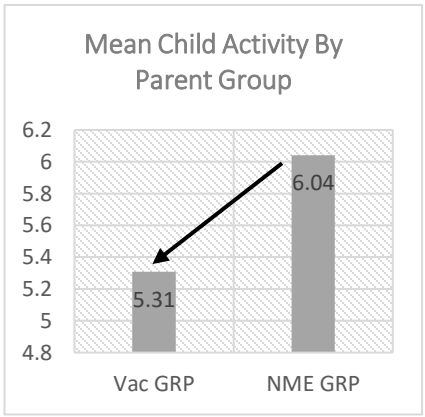


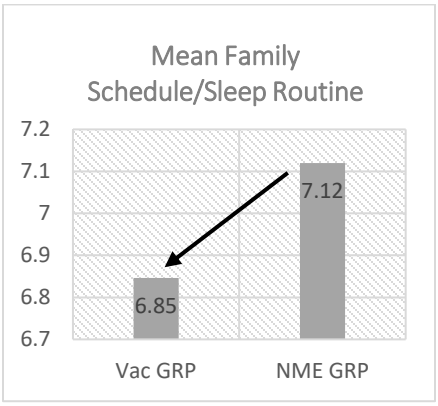












*NOTE: The above ten FNPA category labels are directly taken from the FNPA survey

The group difference in family and child activity is of special note, as the magnitude of this difference may explain why the mean total FNPA score difference between the two groups approaches statistical significance in the following analyses.

The mean FNPA survey score of 65.17 is higher for the exempting parent group than the mean FNPA survey score of 62.54 for the fully vaccinating parent group (Table 5). In unadjusted analysis, this higher score for the exempting parent group is consistent with this study's hypothesis and approaches statistical significance at the alpha=0.10 level for a 1-sided test, but not at the alpha=0.05 level, as originally hypothesized (Table 5). In non-parametric testing, the difference in mean FNPA survey scores between the parent subgroups also approaches significance at the alpha=0.10 level (p-value = 0.106, One-tailed).

Table 5: Outcome Differences by Parent Group Membership for Hypothesis 2

Calculated Measure	Fully Vaccinating Group (Mean Score)	Exempting Group (Mean Score)	Test Type	P(T≤t)
Total FNPA (Food, Nutrition, and Physical Activity) Survey Score	62.54	65.17	One-tail (as higher score in exempting group is hypothesized)	0.101243
Total FNPA Physical Activity Sub-Score	15.42	16.68	One-tail (as higher score in exempting group is hypothesized)	0.070298
Total Food and Beverage Choices FNPA Sub-Score	31.96	32.42	One-tail (as higher score in exempting group is hypothesized, but intergroup difference is small and insignificant)	0.303

Table 5 (Cont'd)

BMI for Male Children (11-13 years of age)	18.67	20.97	One-tail (as lower score in exempting group, not fully vaccinating group, is hypothesized, but intergroup difference is not significant)	0.124055
BMI for Female Children (11-13 years of age)	20.49	19.32	One-tail (as lower score in exempting group is hypothesized, but intergroup difference is small and not significant)	0.20914

When investigating the possible confounding effects of parent age, gender, education, income, and ethnicity on the association between parent subgroup membership and FNPA survey score, male parents, higher parent education, and higher parent income were significantly associated with the FNPA survey score (p-value=0.0028, p-value=0.0428, and p-value=0.0347, respectively) in a series of univariate analyses evaluated at the alpha=.10 level or lower (analyses not shown). Therefore, male parents, higher parent educational attainment (bachelor's degree or higher), and higher parent income ($50,000 or higher) were added to parent group membership in the linear regression models below (Table 6, Model 2, 3, and 4). However, some doubt exists over the true confounding effect of parent gender due to the small number of male exempting parents in the study sample (N=5) (see discussion section for further elaboration).

Table 6: Possible Confounding Influences of Parent Gender, Education, and Income (Outcome=FNPA Survey Score)

	Model 1: Crude Group Membership			Model 2: Adjusted for Male Parents			Model 3: Adjusted for Male Parents and Higher Parent Education		
VARIABLE	PAR EST	STA ERR	Pr>(t)	PAR EST	STA ERR	Pr>(t)	PAR EST	SE ERR	Pr>(t)
NME Parents	2.625	2.03025	0.2025	1.36436	1.93349	0.4840	1.07729	1.91500	0.5766
Male Parents				-6.05106	2.08569	0.0057	-5.46648	2.09122	0.0122
Higher Parent Income							3.27089	2.14675	0.1348

	Model 4: Adjusted for Male Parents, Higher Parent Education, and Higher Parent Income		
VARIABLE	PAR EST	STA ERR	Pr>(t)
NME Parents	-0.26721	2.05396	0.8971
Male Parents	-5.68943	2.05778	0.0084
Higher Parent Education	2.34651	2.18304	0.2884
Higher Parent Income	3.39263	2.08634	0.1112

In adjusted analysis, the nearly significant association between parent group membership and the FNPA survey score at the alpha=0.10 level is attenuated following the addition of male parents in Model 2, the subsequent addition of higher parent education in Model 3, and the subsequent addition of higher parent income in Model 4 (Table 6). In addition, male parents appear to make a significant contribution to the variance of the FNPA survey score in Models 2, 3, and 4 at the alpha=0.05 level, and higher parent education appears to make a non-significant contribution to the variance of the FNPA survey score in Model 3, but not in Model 4 (Table 6). Moreover, parent income appears to make a nearly significant contribution to the variance of

the FNPA survey score at the alpha=.10 level in Model 4. Therefore, Model 4 appears to be the best fit, and parent gender likely confounds, and parent income potentially confounds, the relationship between parent group membership and the FNPA survey score, which indicates that parent gender and parent income, and not parent group membership, potentially explain the observed intergroup variation in the FNPA survey scores. That is, male parents are significantly associated with lower FNPA survey scores compared to female parents, and higher income parents are non-significantly associated with higher FNPA survey scores compared to lower income parents. However, some doubt exists over the true confounding effect of parent gender due to the small number of male exempting parents in the study sample (N=5) (see discussion section for further elaboration).

When investigating the potential of parent income to act as an effect modifier on the association between parent group membership and FNPA survey score, the beta-coefficient of 0.68750 for the interaction term, parent income*parent group membership, was not significantly different from zero (p-value=0.8779), which indicates an absence of effect modification, as the slopes of the higher income parents and lower income parents do not interact (intersect). In addition, no evidence is present that parent gender acts as an effect modifier on the association between parent group membership and FNPA survey score. That is, the beta-coefficient of -1.64586 for the interaction term, parent gender*parent group membership, was not significantly different from zero (p-value=0.7031), which indicates an absence of effect modification, as the slopes of the male parents and female parents do not interact (intersect). However, some doubt exists over the reliability of this test to rule out parent gender as an effect modifier of this association, due to the small number of male

exempting parents (N=5) in this study's sample, which ultimately results in a high standard error of 4.29089 (see Discussion chapter for further elaboration).

Created by summing all five physical activity related FNPA categories, the total mean FNPA physical activity sub-score is 16.68 for the parent exempting group, and the FNPA physical activity sub-score is 15.42 for the fully vaccinating parent group (Table 5). In unadjusted analysis, this higher score for the exempting parent group is consistent with this study's hypothesis and is significant at the alpha=0.10 level for a 1-sided test, but not at the alpha=0.05 level, as originally hypothesized (Table 5). In non-parametric testing (Mann-Whitney Test), the difference in mean FNPA physical activity sub-scores is also significant at the alpha = 0.10 level (p-value = 0.055, One-tailed).

When investigating the possible confounding effects of parent age, gender, education, income, and ethnicity on the association between parent subgroup membership and FNPA physical activity sub-score, male parents and higher parent education were significantly associated with FNPA physical activity sub-score (p-value=0.0141 and p-value=0.0706, respectively) in a series of univariate analyses evaluated at the alpha=.10 level or lower (analyses not shown). Therefore, male parents and higher parent income ($50,000 or higher) were added to parent group membership in the linear regression models below (Table 7, Model 2 and 3).

Table 7: Possible Confounding Influences of Parent Gender and Parent Education (Outcome=FNPA Physical Activity Sub-Score)

	Model 1: Group Membership Crude			Model 2: Adjusted for Male Parents			Model 3: Adjusted for Male Parents and Higher Parent Income		
VARIABLE	PAR EST	STA ERR	Pr>(t)	PAR EST	STA ERR	Pr>(t)	PAR EST	SE ERR	Pr>(t)
NME Parents	1.25692	0.83917	0.1406	0.74500	0.84132	0.3803	0.67070	0.83233	0.4244
Male Parents				-1.95735	0.89218	0.0331	-1.78055	0.88902	0.0510
Higher Parent Income							1.35087	0.90679	0.1430

In adjusted analysis, the significant association between parent group membership and the FNPA physical activity sub-score at the alpha=0.10 level is attenuated following the addition of male parents in Model 2 (although a faint signal may still be present) and the subsequent addition of higher parent income in Model 3 (table 7). In addition, male parents appear to make a significant contribution to the variance of FNPA physical activity sub-score in Model 2 and Model 3 at or near the alpha=0.05 level, and higher parent income appears to make a non-significant contribution to the variance of FNPA physical activity sub-score in Model 3 at the alpha=.10 level (Table 7). Therefore, Model 3 appears to be the best fit, and parent gender likely confounds, and parent income potentially confounds, the relationship between group membership and the FNPA physical activity sub-score, which indicates that parent gender and parent income, and not parent group membership, potentially explain the observed intergroup variation in FNPA physical activity sub-scores. That is, male parents are significantly associated with lower FNPA physical activity sub-scores compared to female parents, and higher income parents are significantly associated with higher FNPA physical activity sub-scores compared to lower income parents.

When investigating the potential of parent income to act as an effect modifier on the association between parent group membership and FNPA physical activity sub-score, the beta-coefficient of 0.23611 for the interaction term, parent income*parent group membership, was not significantly different from zero (p-value=0.8965), which indicates an absence of effect modification, as the slopes of the higher income parents and lower income parents do not interact (intersect). In addition, no evidence is present that parent gender acts as an effect modifier on the association between parent group membership and FNPA physical activity sub-score. That is, the beta-coefficient of -0.63571 for the interaction term, parent gender*parent group membership, was not significantly different from zero (p-value=0.7331), which indicates an absence of effect modification, as the slopes of the male parents and female parents do not interact (intersect).

Created by summing all 10 food and beverage choice-related categories, the total mean FNPA food and beverage choice-related sub-score of 32.42 for the exempting parent group is higher than the total mean FNPA food choice-related sub-score of 31.96 for the fully vaccinating parent group (Table 5). The higher score for the exempting parents is consistent with this study's hypothesis, but the difference is not significant (Table 5). In non-parametric testing (Mann-Whitney Test), the difference in mean FNPA food and beverage choice-related sub-scores between the two parent subgroups is also not significant (p-value = 0.234, One-tailed)

Estimated BMI for male and female children was calculated by dividing parent-reported weight for their child in pounds by parent-reported height for their child in inches squared and then multiplying the result by a factor of 703 (estimated BMI could not be standardized by

child's birth month, as birth date information was not collected). The mean estimated BMI of 19.32 for girls with exempting parents is lower than the mean estimated BMI of 20.49 for girls with fully vaccinating parents (Table 5), which is consistent this study's hypothesis, but this difference is not significant (Table 5). The mean estimated BMI of 21.06 for boys with exempting parents is higher than the mean estimated BMI of 18.69 for boys with fully vaccinating parents (Table 5), which is not consistent this study's hypothesis, but this difference is not significant (Table 5). Typically, relying on parent estimated BMI may introduce non-differential information bias, which results in a bias toward the null (or no difference). However, in this case, it's likely that the fully vaccinating parents more accurately estimated the height and weight of their child because fully vaccinating parents always accompanied their child to the LHD for vaccination, and exempting parents may or may not have brought their child to the HD for the mandatory waiver education session. That is, fully vaccinating parents conveniently could check their estimates with their child on the spot at the LHD (which potentially explains the smaller variance in the estimates made by the fully vaccinating parents). In this case, the potentially less accurate estimates of the exempting parents could introduce non-differential or differential information bias (depending, for example, on whether inaccurate outlier values are balanced or not balanced around the true mean). Given these uncertainties, the above assessment of the mean BMI differences in male and female children for exempting and fully vaccinating parent groups cannot be considered reliable.

Results for Hypothesis 3

The total mean inconvenience score is derived by summing the scores of the three inconvenience-related measures; and the total mean inconvenience score of 16.39 for the fully

vaccinating parent group is significantly higher than the total mean inconvenience score of 6.48 for the exempting parent group (Table 8) at the alpha=0.05 level, which is consistent with this study's hypothesis. Therefore, in unadjusted analysis, significant evidence is present that fully vaccinating parents appear more sensitive to the total role of inconvenience than exempting parents when making vaccination-related decisions for their school-aged children. In non-parametric testing (Mann-Whitney Test), the difference in total mean inconvenience scores between the parent subgroups is also significant (p-value = less than 0.0001, One-tailed)

Table 8: Outcome Differences by Parent Group Membership for Hypothesis 3

Survey Item (Construct) or Calculated Measure	Fully Vaccinating Group (Mean Score)	Exempting Group (Mean Score)	Test Type	P(T≤t) for Unadjusted Analyses	P-value for Adjusted Analyses
Total Inconvenience	16.39	6.48	One-tail (as higher score in fully vaccinating group is hypothesized)	1.2E-06	<.0001*
Knowing that parents are required to attend an educational session at the health department before a vaccination waiver can be obtained motivates me to get shots for my child. (inconvenience associated with required attendance at waiver education session)	4.54	2.04	One-tail (as higher score in fully vaccinating group is hypothesized)	0.00131	0.0065*

Table 8 (Cont'd)

Knowing that my child can be sent home from school for up to several weeks during a disease outbreak motivates me to get shots for my child. (inconvenience associated with school dismissal)	6.96	2.64	One-tail (as higher score in fully vaccinating group is hypothesized)	4.91E-07	<.0001*
Convenience plays a role in my decision-making when I consider my child's shots. (shot convenience)	4.89	1.8	One-tail (as higher score in fully vaccinating group is hypothesized)	8.89E-05	0.0024*
Total Social Encouragement / Support	7.2	3.74	Two-tail (as higher score in exempting group, not fully vaccinating group, is hypothesized, but intergroup difference is large and significant)	0.00126	0.0250*
Encouragement from other people is important to me when I consider my child's shots. (social encouragement)	4.69	2.06	Two-tail (as higher score in exempting group, not fully vaccinating group, is hypothesized, but intergroup difference is large and significant)	0.001126	0.0151*
I worry about losing support from, or jeopardizing my relationships with, people close to me if I change my opinion about my child's shots. (social support)	2.4	1.68	Two-tail (as higher score in exempting group, not fully vaccinating group, is hypothesized, but intergroup difference is small and insignificant)	0.164	0.5865*

* adjusted for parent gender, parent age, parent education, parent income, and parent ethnicity

When investigating the possible confounding effects of parent age, gender, education, income, and ethnicity on the association between parent subgroup membership and total inconvenience, only higher parent income was significantly associated with total inconvenience (p-value=0.0769) in a series of univariate analyses evaluated at the alpha=.10 level or lower (analyses not shown). Therefore, higher parent income ($50,000 or higher) was added to parent group membership in the linear regression model below (Table 9, Model 2).

Table 9: Possible Confounding Influences of Higher Parent Income (Outcome=Mean Total Inconvenience)

	Model 1: Group Membership Crude			Model 2: Adjusted for Higher Parent Income		
VARIABLE	PAR EST	STA ERR	Pr>(t)	PAR EST	STA ERR	Pr>(t)
NME parents	-9.90462	1.84176	<.0001	-9.61765	1.96942	<.0001
Higher Parent Income				-0.86356	1.97246	0.6635

In adjusted analysis, group membership continues to explain significant variation in total inconvenience following the addition of higher parent income in Model 2, but higher parent income does not appear to make a significant contribution to the variance of total inconvenience in Model 2 (Table 9). Therefore, higher parent income does not appear to confound the relationship between parent group membership and total inconvenience, and the unadjusted model (Model 1) appears to be the best fit.

The mean required waiver education session inconvenience score of 4.54 for the fully vaccinating parent group is significantly higher than the mean required waiver education inconvenience score of 2.04 for the exempting parent group at the alpha=0.05 level (Table 8), which is consistent with this study's hypothesis. Therefore, in unadjusted analysis, significant evidence is present that parents electing to fully vaccinate their child entering 7th grade are

more sensitive to the inconvenience associated with attending a waiver education session as a condition for filing NMEs than parents electing to file NMEs for their child entering 7th grade. In non-parametric testing (Mann-Whitney Test), the difference in mean waiver education session inconvenience between the parent subgroups is also significant (p-value = 0.0025, One-tailed). When investigating the possible confounding effects of parent age, gender, education, income, and ethnicity on the association between parent subgroup membership and required waiver education-related inconvenience, none of these covariates was significantly associated with waiver education-related inconvenience in a series of univariate analyses evaluated at the alpha=.10 level or lower (analyses not shown). Therefore, the unadjusted model is the best fit.

The mean school dismissal-related inconvenience score of 6.96 for the fully vaccinating parent group is significantly higher than the mean school dismissal-related inconvenience score of 2.64 for the exempting parent group at the alpha=0.05 level (Table 8), which is consistent with this study's hypothesis. Therefore, in unadjusted analysis, significant evidence is present that parents electing to fully vaccinate their child entering 7th grade are more sensitive to the inconvenience associated with school dismissal (in hypothetical disease outbreak situations) than parents electing to file NMEs for their child entering 7th grade. In non-parametric testing (Mann-Whitney Test), the difference in mean school dismissal-related inconvenience between the parent subgroups is also significant (p-value = less than 0.0001, One-tailed).

When investigating the possible confounding effects of parent age, gender, education, income, and ethnicity on the association between parent subgroup membership and school dismissal-related inconvenience, only higher parent income was significantly associated with school dismissal-related inconvenience (p-value=0.1049) in a series of univariate analyses

evaluated at the alpha=.10 level or lower (analyses not shown). Therefore, higher parent income ($50,000 or higher) was added to parent group membership in the linear regression model below (Table 10, Model 2).

Table 10: Possible Confounding Influences of Parent Income (Outcome=Mean School Dismissal-Related Inconvenience)

	Model 1: Group Membership Crude			Model 2: Adjusted for Higher Parent Income		
VARIABLE	PAR EST	STA ERR	Pr>(t)	PAR EST	STA ERR	Pr>(t)
NME Parents	-4.32154	0.77254	<.0001	-4.26471	0.82737	<.0001
Higher Parent Income				-0.17102	0.82865	0.8374

In adjusted analysis, group membership continues to explain significant variation in school dismissal-related inconvenience following the addition of higher parent income in Model 2, but higher parent income does not appear to make a significant contribution to the variance of school dismissal-related inconvenience in Model 2 (Table 10). Therefore, higher parent income does not appear to confound the relationship between parent group membership and school dismissal-related inconvenience, and the unadjusted model (Model 1) appears to be the best fit.

The mean shot-related inconvenience score of 4.89 for the fully vaccinating parent group is significantly higher than the mean shot-related inconvenience score of 1.8 for the exempting parent group at the alpha=0.05 level (see Table 8), which is consistent with this study's hypothesis. Therefore, in unadjusted analysis, significant evidence is present that parents electing to vaccinate their children entering 7th grade are more sensitive to the general inconvenience associated with obtaining childhood vaccinations than parents electing to file NMEs for their children entering 7th grade. In non-parametric testing (Mann Whitney Test), the

difference in mean shot-related inconvenience scores between the parent subgroups is also statistically significant (p-value=0.000, One-tailed).

When investigating the possible confounding effects of parent age, gender, education, income, and ethnicity on the association between parent subgroup membership and shot-related inconvenience, parent age, gender, education, and income were significantly associated with shot-related inconvenience (p-value=0.0672, p-value=0.0707, p-value=0.0541, and p-value=0.0681, respectively) in a series of univariate analyses evaluated at the alpha=.10 level or lower (analyses not shown). Therefore, parent age, male parents, higher parent education (bachelor's degree or higher), and higher parent income ($50,000 or higher) were added sequentially to parent group membership in the linear regression models below (Table 11, Model 2, 3, 4, and 5).

Table 11: Possible Confounding Influences of Parent Age, Gender, Education, and Income (Outcome=Mean Shot-Related Inconvenience)

	Model 1: Group Membership Crude			Model 2: Adjusted for Parent Age			Model 3: Adjusted for Parent Age and Male Parents		
VARIABLE	PAR EST	STA ERR	Pr>(t)	PAR EST	STA ERR	Pr>(t)	PAR EST	SE ERR	Pr>(t)
NME Parents	-3.08462	0.74932	0.0001	-3.05513	0.74067	0.0002	-2.98495	-3.84	0.0004
Parent Age				0.10630	0.05161	0.0450	0.10026	1.81	0.0761
Male Parents							0.28567	0.33	0.7434
	Model 4: Adjusted for Parent Age, Male Parents, and Higher Parent Education			Model 5: Adjusted for Parent Age, Male Parents, Higher Parent Education, and Higher Parent Income					
VARIABLE	PAR EST	STA ERR	Pr>(t)	PAR EST	STA ERR	Pr>(t)			
NME Parents	-2.98698	0.74139	0.0002	-2.47923	0.76225	0.0022			
Parent Age	0.03088	0.06029	0.6110	0.03988	0.05857	0.4996			

Table 11 (Cont'd)

Male Parents	0.90919	0.86802	0.3005	1.08351	0.84543	0.2067
Higher Parent Education	2.22063	0.93852	0.0223	2.62566	0.93170	0.0072
Higher Parent Income				-1.52874	0.76885	0.0530

In adjusted analysis, group membership continued to explain significant variation in shot-related inconvenience following the sequential addition of parent age in Model 2, parent gender in Model 3, higher parent education in Model 4, and higher parent income in Model 5 (Table 11). In addition, male parents were not significantly associated with shot-related inconvenience in any of the adjusted models, and parent age was no longer significantly associated with shot-related inconvenience following the addition of higher parent education in Model 4 (Table 11). However, higher parent education explained significant variation in shot-related inconvenience in Model 4, and higher parent education and higher parent income explained significant variation in shot-related inconvenience in Model 5 (Table 11). Therefore, Model 5 appears to be the best fit. Accordingly, parents with higher education attainment, compared to parents with lower educational attainment, are significantly associated with increased receptivity to the role of shot-related inconvenience when making vaccination-related decisions for their school-aged children; and parents with higher incomes, compared to parents with lower incomes, are significantly associated with decreased receptivity to the role of shot-related inconvenience when making vaccination-related decisions for their school-aged children. Moreover, in Model 5, exempting parents, compared to the fully vaccinating parents,

are significantly associated with decreased receptivity to the role of shot-related inconvenience when making vaccination-related decisions for their school-aged children.

Researchers of vaccine hesitancy in parents of school-aged children typically do not quantitatively investigate the role of social encouragement or social support in parental decision-making about their children's vaccinations, nor do they tend to comparatively assess levels of social encouragement and social support in vaccination-related decision-making between fully vaccinating and exempting parents (for examples of the conventional research approach see [34][65-69]). In this study, the total mean social support score is derived by summing the scores of the two social support-related measures; and the total mean social support score of 7.2 for the fully vaccinating parent group is significantly higher than the mean total social support score of 3.74 for the exempting parent group at the alpha=0.05 level (Table 8), which is a surprise finding. The original hypothesis predicted that the exempting parents, not the fully vaccinating parents, would be more sensitive to the role of social encouragement and social support. However, the fully vaccinating parents, not the exempting parents, appear to be more sensitive in unadjusted analysis to the role of social encouragement and support when making vaccination-related decisions for their school-aged children. In non-parametric testing (Mann-Whitney Test), the mean difference in total social encouragement/support scores between the parent subgroups is also statistically significant (p-value = 0.000, Two-tailed).

When investigating the possible confounding effects of parent age, gender, education, income, and ethnicity on the association between parent subgroup membership and total social support sensitivity, only parent gender and parent income were significantly associated with

social encouragement (p-value=0.0645 and p-value=0.0367, respectively) in a series of univariate analyses evaluated at the alpha=.10 level or lower (analyses not shown). Therefore, male parents and higher parent income ($50,000 or higher) were added sequentially to parent group membership in the linear regression models below (Table 12, Model 2 and Model 3).

Table 12: Possible Confounding Influences of Parent Gender and Parent Income (Outcome=Mean Total Social Support)

	Model 1: Group Membership Crude			Model 2: Adjusted for Male Parents			Model 3: Adjusted for Male Parent Higher Parent Income		
VARIABLE	PAR EST	STA ERR	Pr>(t)	PAR EST	STA ERR	Pr>(t)	PAR EST	SE ERR	Pr>(t)
NME Parents	-3.46000	1.00959	0.0013	-3.13874.	1.03997	0.00410	-2.64056	1.11143	0.0217
Male Parents				1.33858	1.11471	0.2358	1.43223	1.11143	0.2040
Higher Parent Income							-1.32141	1.07799	0.2265

In adjusted analysis, parent group membership continues to explain significant variation in total social support sensitivity following the addition of parent gender in Model 2 and the subsequent addition of parent income in Model 3, but neither parent gender nor parent income appears to make a significant contribution to the variance of total social support sensitivity in Model 2 or Model 3 (Table 12). Therefore, parent gender and parent income do not appear to confound the relationship between parent group membership and total social support sensitivity, and the unadjusted model (Model 1) appears to be the best fit.

The mean social encouragement score is 4.69 for the fully vaccinating parent group is significantly higher than the mean social encouragement score of 2.06 for the exempting parent group at the alpha=0.05 level (Table 8), which is a surprise finding. The original hypothesis predicted that exempting parents, not fully vaccinating parents, would be more sensitive to the

role of social encouragement. However, fully vaccinating parents, not exempting parents, appear to be more sensitive in unadjusted analysis to the role of social encouragement when making vaccination-related decisions for their school-aged children. In non-parametric testing (Mann-Whitney Test), the difference in mean social encouragement scores between the parent subgroups is also significant (p-value = 0.001, Two-tailed)

When investigating the possible confounding effects of parent age, gender, education, income, and ethnicity on the association between parent subgroup membership and social encouragement, only higher parent income was significantly associated with social encouragement (p-value=0.0407) in a series of univariate analyses evaluated at the alpha=.10 level or lower (analyses not shown). Therefore, higher parent income ($50,000 or higher) was added to parent group membership in the linear regression model below (Table 13, Model 2).

Table 13: Possible Confounding Influences of Parent Income (Outcome=Mean Social Encouragement)

	Model 1: Group Membership Crude			Model 2: Adjusted for Higher Parent Income		
VARIABLE	PAR EST	STA ERR	Pr>(t)	PAR EST	SE ERR	Pr>(t)
NME Parents	-2.63231	0.75681	0.0011	-2.32353	0.79975	0.0055
Higher Parent Income				-0.92919	0.80098	0.2518

In adjusted analysis, parent group membership continues to explain significant variation in social encouragement sensitivity following the addition of higher parent income in Model 2, but higher parent income does not appear to make a significant contribution to the variance of social encouragement sensitivity in Model 2 (Table 13). Therefore, higher parent income does not appear to confound the relationship between parent group membership and social encouragement sensitivity, and the unadjusted model (Model 1) appears to be the best fit.

The mean social support score of 2.4 for the fully vaccinating parent group is not significantly higher than the mean social support score of 1.68 for the exempting parent group (Table 8), which is a surprise finding. The original hypothesis predicted that exempting parents, not fully vaccinating parents, would be more sensitive to the role of social support at the alpha=0.05 level. However, the mean social support difference between the parent subgroups is not statistically significant although a weak signal may be present for a two-tailed test (Table 8), which suggests that fully vaccinating parents, not exempting parents, appear to be more sensitive in unadjusted analysis to the role of social support when making vaccination-related decisions for their school-aged children. In non-parametric testing, the difference in mean social support scores between the parent subgroups more closely approaches statistical significance at the alpha-0.05 level (p-value = 0.064, Two-tailed test).

When investigating the possible confounding effects of parent age, gender, education, income, and ethnicity on the association between parent subgroup membership and social support, only parent gender was significantly associated with social support (p-value=0.0573) in a series of univariate analyses evaluated at the alpha=.10 level or lower (analyses not shown). Therefore, parent gender (male parent) was added to group membership in the linear regression model below (Table 14, Model 2).

Table 14: Possible Confounding Influences of Parent Gender (Outcome=Mean Social Support)

	Model 1: Group Membership Crude			Model 2: Adjusted for Male Parents		
VARIABLE	PAR EST	STA ERR	Pr>(t)	PAR EST	STA ERR	Pr>(t)
NME Parents	-0.72000	0.50899	0.1636	-0.50268	0.51783	0.3366
Male Parents				0.90551	0.55504	0.1095

In adjusted analysis, parent group membership does not continue to explain significant variation (at the alpha=0.10 level) in social support sensitivity following the addition of parent gender in Model 2 (although a faint signal may still be present), but parent gender does appear to make a significant contribution to the variance of social support sensitivity in Model 2 at or near the alpha=0.10 level (Table 14). Therefore, parent gender potentially confounds the relationship between parent group membership and social support sensitivity, and Model 2 appears to be the best fit. That is, male parents, compared to female parents, are significantly associated with increased sensitivity to social support loss when asked to consider changing their opinion about their children's shots.

Chapter 6: Study Discussion

The sample data appear to refute the first part of this study's first hypothesis, including that:

1. The fully vaccinating parents exhibit decision-making characteristics informed by a low ideological commitment to healthism and low trust in conventional medical/health authorities;
2. This observed pattern maps to the agnostic parent subgroup category; and
3. The proposed mini-assessment demonstrates high agreement between these observed trust and healthism characteristics of the fully vaccinating parents and the presumed categorization of these parents as agnostics, based on their actual behavior of waiting until late July or later prior to the commencement of the school year to ensure that their children entering 7th grade comply with school-entry immunization requirements through vaccination.

Instead, this field study reveals that these fully vaccinating parents seemingly map to the investigator parent subgroup category, characterized by a high healthism and high trust informed decision-making pattern. Since none of the vaccinating parents map to the agnostic category, no sensitivity or specificity measures are carried out, as the true positive proportion is 0%. However, the observed characterization of this parent subgroup cannot be considered conclusive due to uncertainties related to the reliability of the healthism measure utilized in this study. The similar high mean healthism scores of the fully vaccinating and activist parent subgroups may signal that either the healthism measure is too unreliable and therefore uninformative as an invalid construct, or that the healthism measure is informative as a valid construct, but that the presence of healthism is so ubiquitous and pervasive in the United

States that it cannot be employed to enhance characterization of heterogenous subgroups of parents responsible for the vaccination-related status of their children entering 7th grade.

Concerted efforts to avoid creating a homological relationship between the healthism and trust constructs appear successful: the correlation coefficient is 0.045 (indicating relative independence of the two constructs). However, this effort to create an independent healthism construct, when considered in conjunction with a relatively naïve effort to create a singular, convenient-to-use healthism measure, may have backfired and resulted a healthism question that is too general. The question reads: "It is my role as a parent to actively make decisions about shots for my child," which evokes strong agreement in all, or nearly all, parents irrespective of subgroup membership. It is possible that all parents strongly agree with this statement in order to maintain their sense of being competent parents, of faithfully executing their central role as the protectors of their child's general well-being. The need to improve the reliability of the healthism measure is further justified by the presence of evidence in the sample suggesting greater variation in healthism-related commitments between the fully vaccinating and activist parent subgroups. That is, despite the relatively high mean scores of health(ism) as a super value measure ("Health is the most important value to me, more important than politics, religion or economics") exhibited by the activist and fully vaccinating parent subgroups, the expected higher mean score finding of the activist parent subgroup indirectly signals potentially greater variation in the levels of healthism-related ideological commitment (the degree to which parents assume responsibility for and control over their child's health behaviors) between the two parent subgroups than picked up by the primary (and potentially more problematic) measure of healthism utilized in this study.

To derive a more conclusive answer to the question of whether the similarly high mean healthism scores across the activist and fully vaccinating parent subgroups observed in this study result from unreliable measurement of the healthism construct or from the ubiquitous and pervasive presence of the healthism socio-cultural phenomenon in U.S. society in general and northern lower Michigan in particular, utilization of a more refined, validated instrument to measure the healthism construct or close proxy is required. Such an instrument ideally must be able to assess the healthism construct as independently as possible from the trust in conventional medical authorities construct or close proxy. This complex challenge of establishing independence between the healthism and trust constructs can be illustrated by closely examining a survey question that Casiday el al. utilized to assess trust levels in medical professionals across MMR-accepting parents and MMR-refusing parents in the UK: "Parents should make health decisions for their own child rather than leaving it up to the professionals" [70, p. 181]. While Casiday et al. report a significant difference between the proportion of MMR-refusing parents strongly agreeing or agreeing with the statement compared to the proportion of MMR-accepting parents strongly agreeing or agreeing with it (88.3% v. 64.6%) [70]; the mention of professionals in the statement likely establishes a connection between trust of (medical) professionals and the health decisions parents make for their children. An equally strong case can be made that part of the statement focusing on parent control in the medical encounter also establishes a connection between the agency of parents and the health decisions parents make for their children. As such, it is difficult to determine precisely which construct (healthism or trust) the question measures.

Despite this complex challenge, the Multidimensional Health Locus of Control (MHLC) Scales appear to independently assess the healthism and trust constructs. MHLC is comprised of 3 unique subscales: 1. Internal Health Locus of Control or IHLC, 2. Powerful Others Health Locus of Control or PHLC, and 3. Chance Health Locus of Control (CHLC). The IHLC is specifically dedicated to measuring the degree to which individuals believe that their health status is determined their own behavior, over which they exercise direct personal control [71]. As such, the IHLC is a close proxy to the healthism construct that this study seeks to measure. Anderson and Dedrick report a weak correlation between IHLC and the Trust in Physician Scale (in their cross-sectional study conducted on a sample of patients with non-insulin dependent diabetes seeking to validate the trust construct through assessment of predicted correlations with theoretically-related health locus of control measures, including IHLC, PHLC, and CHLC measures): "Associations between trust and internal locus of control ($r=-.07$, $p>.05$) and trust and chance locus of control ($r=.16$, $p<.05$) were relatively weak, indicating that the trust scale and health locus of control are relatively distinct constructs" [72, p. 1095]. In a second validation study (conducted on an independent sample), Anderson and Dedrick report a similarly weak to modest magnitude of correlation between IHIC and the Trust in Physician Scale: "…trust was only modestly correlated with belief in internal control ($r=.17$, $p<.05$)" [72, p. 1098].

The IHLC consists of six questions and is available in two versions, Form A and B, which are highly correlated [72] (Table 15).

Table 15: IHLC Questions, Form A and Form B

Form A*	Form B*
1. "If I get sick, it is my own behavior which determines how soon I get well again."	1. "If I become sick, I have the power to make myself well again."

Table 15 (Cont'd)

2. "I am in control of my own health."	2. "I am directly responsible for my own health."
3. "When I get sick, I am to blame."	3. "Whatever goes wrong with my health is my own fault."
4. "The main thing that effects my health is what I myself do."	4. "My physical well-being depends on how well I take care of myself."
5. "If I take care of myself, I can avoid illness."	5. "When I feel ill, I know it is because I have not been taking care of myself properly."
6. "If I take the right actions, I can avoid illness."	6. "I can pretty much stay healthy by taking good care of myself."

*Questions directly quoted from Physician [i]n Trust Scale as represented by Anderson and Dedrick

Select items from Form A or Form B can be adapted from the self-centric (parent) context to the child-centric context when parents function as general health decision-making proxies for their child. For example, in Form A, "If I take the right actions, I can stay healthy" can be adapted to "If I take the right actions for my child, my child can stay healthy." However, other items in Form A are more difficult to adapt to the context of parents functioning as general health behavior decision-making proxies for their child. For example, adapting "I am in control of my own health" to "I am in control of my child's health" is more problematic, as parents are frequently not in the position to control their child's health promoting behaviors (e.g., handwashing at school). The same type of adaptation challenge exists for Form B. In addition, select items from Form A and Form B can be adapted from the self-centric (parent) context to the child-centric context when parents act as more specific vaccination-related decision-making proxies for their child. For example, in Form A, "I am in control of my own health" could be adapted to "I am in control of my child's shots." However, other items in Form A are less conducive to adaption in the context of parents functioning as specific vaccination-related decision-making proxies for their child. For example, adapting "If I take the right actions, I can

stay healthy" to "If I take the right actions about my child's shots, my child can stay healthy" is problematic, as the fully vaccinating parents are just as likely to interpret "right actions" as vaccination and to subsequently strongly agree with the statement as the activist parents are likely to interpret "right actions" as NME filing and to subsequently strongly agree with the statement.

If IHLC Form A or B cannot be readily and appropriately adapted from a parent self-centric to child-centric context when parents act either as a general health behavior decision-making proxy or a more specific vaccination-related decision-making proxy for their child, an interesting alternative to consider is utilizing IHLC in its original form as a close proxy healthism measure to assess potential differences in vaccination-related decision-making drivers across the activist and fully vaccinating parent subgroups. To do so requires making the strong assumption that parents transfer internal health locus of control expectancies over their own personal health behaviors to their governance of the general health behaviors and specific vaccination-related behaviors of their child entering 7th grade. In a refined alternative hypothesis based on this assumption, activist parents utilizing LHD vaccination-related services (to file NMEs for their school-aged child) would be expected to exhibit a higher total mean IHLC Scale score compared to fully vaccinating parents. In addition to utilizing the IHLC scale to assess healthism levels across parent subgroups, a complementary approach would replace this study's potentially problematic healthism question with a more reliable singular question such as "It is my responsibility as a parent to control the decision-making process regarding my child's shots." This question is informed by the IHLC scale's more precise focus on control that

takes advantage of the scale's demonstrated independence of physician-related trust questions.

The sample data partially support the second part of this study's first hypothesis, including that:

1. The activist parents exhibit vaccination-related decision-making characteristics informed by a high ideological commitment to healthism and low trust in conventional medical authorities;
2. This observed pattern maps to the activist parent subcategory; and
3. The proposed mini-assessment demonstrates moderate agreement between these observed trust and healthism characteristics of the activist parents and the presumed characterization of these parents as active vaccine delayers and/or refusers, based on their actual behavior of filing NMEs for their child entering 7th grade.

Only 10/24 or 42% of the exempting parents in the sample map to the activist parent subgroup category (characterized by high healthism and low trust), which equates to a 42% sensitivity calculation for the mini-assessment when the calculation is strictly based on the a priori selected main trust measure. However, the work of Larson et al. can be drawn upon in post-hoc analyses to:

1. Generate insight into why 54% of activist parents in the study sample trust conventional medical/health authorities but still refuse and/or delay vaccination for their child entering 7th grade, and
2. Refine the mini-assessment to be more sensitive to other sources of distrust impacting parental vaccination-related decision-making.

In a systematic review of the multi-faceted relationship between trust and vaccination-related decision-making, Larson et al. identify multiple trust sources that contribute to public confidence in vaccination, including the importance of maintaining trust in vaccine products, trust in the providers who offer and deliver vaccinations, and trust in the policy-makers who approve of and recommend vaccines [73]. While the vaccine confidence question in this study was originally conceived as a crude proxy for measuring vaccine hesitancy and comparatively assessing levels of vaccine hesitancy across activist and fully vaccinating parent groups, it is clear from the work of Larson et al. that the question is more centrally (and therefore more appropriately) related to trust in the efficacy and safety of the vaccination-related product. In fact, this study's finding in unadjusted analysis that parents in the fully vaccinating group exhibit significantly higher mean confidence scores in the safety and efficacy of vaccination compared to the activist parents (8.96 v. 3.8, p-value=3.82E-10) is consistent with multiple studies, including several studies [65][66][68] and one review with 41/71 studies focused on the HPV vaccine (which is not included as part of school immunization requirements) [69]. Operating from this more informed perspective, it is possible to observe in post-hoc analysis that the subgroup of activist parents exhibiting relatively high trust levels in conventional medical/health authorities do not exhibit on average the same relatively high trust levels in the safety and efficacy of vaccination. Specifically, 8/13 of these parents shift into the activist parent subgroup category when trust in vaccination is taken into consideration.

In addition, it is possible to combine the trust in conventional medical/health authorities measure with the confidence in the safety and efficacy of vaccination measure (low trust in medical/health authorities and low trust in the safety and efficacy of vaccination are defined by

respondent scores of 1-5 for each of these measures) in post-hoc analysis to create a new assessment that improves the sensitivity of predicting the behavior of activist parents prior to LHD service delivery, 75% v. 45%, while mildly degrading specificity, 88% v. 96% (Figure 5).

Figure 5: Sensitivity and Specificity Plot (TP=True Positive, FN=False Negative, TN=True Negative, FP=False Positive are relative to activist parents only) Based on Combined Measure of Trust in Conventional Medical/Health Authorities or Trust in Vaccination Safety and Efficacy

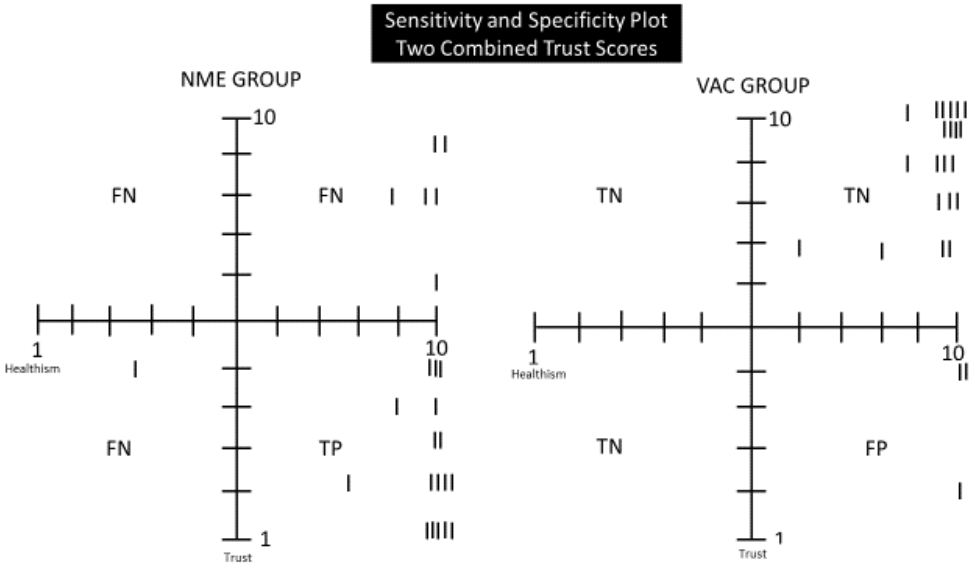


Table 16: Sensitivity and Specificity Calculation Based on Healthism and Trust in Conventional Medical/Health Authorities or Trust in Vaccines

	D+ = NME+	D- = NME-(VAC)	
T+	18 TP	3 FP	21
T-	6 FN	21 TN	27
	24	24	

Sensitivity = 18/24 = 75%
Specificity = 21/25 = 88%
Positive Predictive Value = 18/21 = 86%
Negative Predictive Value = 78%

It is also possible that the sensitivity of the novel mini-assessment is reduced by the utilization of this study's main trust measure (in medical/health authorities) that fails to distinguish, as recommended by Larson et al., between the morality or integrity and competency of the multiple actors involved with the approval, recommendation, and delivery of vaccination [73].

> Within the qualitative research, it was evident that distrust based on value misalignment was particularly likely when HCP (Health Care Professionals] financial incentives for vaccinating were identified. This form of distrust is distinct from the distrust caused by perceptions of incompetence. Currently this distinction is left largely unexamined by much of the vaccine-related trust research. The inclusion of a validated psychometric scale or the custom design of two trust questions (one related to performance reliability and one related to perceived motives and mortality/values of a trusted party), would allow for a much more nuanced explanation of these different trust dynamics [73, p. 1607].

The 11-item Trust in Physician Scale appears to include items that account for this distinction between morality or integrity and competency: "My doctor is a real expert in taking care of medical problems like mine" (which is an example of a competency focused question) and "I trust my doctor to put my medical needs above all other considerations when treating my medical problems" (which is an example of a morality or integrity focused question) [72, p. 1045]. However, these questions are not specifically targeted to the context of childhood vaccinations required for school-entry. Nonetheless, these two questions can be utilized as examples to inform and transform the main trust (in medical/health authorities) question utilized in this study. For example, "I trust recommendations from members of the medical community (e.g., doctors, nurses, public health officers) about my child's shots" could be converted into two new separate versions, with the first focusing on trust in medical/health authorities based on perceptions of competency: "I trust recommendations from members of the medical community (e.g., doctors, nurses, public health officers) about my child's shots

because they are highly competent to make these recommendations;" and the second focusing on trust in medical/health authorities based on perceptions of morality or integrity: "I trust recommendations from members of the medical community (e.g., doctors, nurses, public health officers) about my child's shots because they always place the best interests of my child first." Increasing the precise measurement of trust in medical/health authorities based on perceptions of competency and/or moral or ethical virtue hypothetically can reduce the false negative proportion of activist parents who map to the investigator parent subgroup category, as these parents may exhibit greater variation in trust expression depending on the type of trust measured. This enhanced precision can increase the potential sensitivity of this study's screening assessment. Relatedly, to more reliably classify parents responsible for the vaccination-related status of their school-aged children, the theoretical framework developed by Peretti-Watel et al. should be extended to include the assessment of vaccination-related trust in all of its prominent dimensions, including provider-related, vaccine-related, and health system wide-related trust.

Despite the imprecision of this study's original singular trust measure, trust is more reliably measured in this study compared to the healthism measurement based on 2 key factors:

1. The two combined trust measures reliably categorize activist parents in a manner predicted by this study's original hypothesis (although the second trust measure was applied in post-hoc analysis);

2. Two sources of vaccination-related trust are evaluated (trust in the provider and trust in the product), consistent with the observation of Larson et al. that vaccination-related trust is generated from multiple sources.

Accepting the validity of this study's two trust measures but questioning the validity of the healthism measure calls into question – if not leading to outright rejection of – one of this study's main underlying assumptions: that the fully vaccinating parents who wait until the summer or late summer just prior to the start of the school-year to ensure that their child entering 7th grade complies with school-entry immunization requirements through vaccination are appropriately classified as agnostics. Instead, based on high or relatively high expression of trust, 21/24 or 87.5% of these parents scored each of the two trust questions no lower than a 7/10. As a result, these 21 fully vaccinating parents in the study sample are likely more accurately classified as investigators or conformists (depending on non-biased ascertainment of the healthism measure, which is doubted in this study). However, for the 3 fully vaccinating parents who falsely tested positive for classification into activist parent subgroup category (consistent with NME filing), these parents theoretically may fall more truly into the agnostic parent subgroup category (again depending on non-biased assessment of healthism, which is doubted in this study). As a result, a possible alternative hypothesis would be that parents who wait until the summer or late summer prior to the start of the school-year to obtain vaccination at their LHD for their children entering 7th grade to comply with school-entry immunization requirements represent a complex mixture, characterized by:

1. A smaller proportion of agnostic parents who are truly nudged by the prospect of facing increased inconvenience into vaccination acceptance, and

2. A larger proportion of investigator and conformist parents who characteristically accept vaccination, but who are simply ending their procrastination prior to the start of the school year.

However, a more conclusive finding depends on utilization of a more reliable measure of healthism in a future investigation. And finally, it is worth noting that the 3/24 or 12.5% of the fully vaccinating parents who falsely tested positive as activists may be at elevated risk of delaying and/or refusing vaccination for their school-aged children sometime in the future, and 4/24 or 16.66% of the fully vaccinating parents who score a 7/10 on at least one of the trust measure exhibit lower levels of trust in medical/health authorities and/or in vaccination safety and efficacy than desired, as any indication of less than full trust is reason for concern from a public health perspective. Conversely, it is also worth noting that 5/24 or 20.83% of the activist parents who score 4/10 or 5/10 on at least one of the two trust measures may exhibit some doubt in their commitment to delaying and/or refusing vaccination for their children entering 7^{th} grade. This doubt may signal that some activist parents have not yet completely formed a social identity defined by the high risk/low benefit of vaccination-related prototype.

Evaluation of this study's second hypothesis that activist parents, compared to fully vaccinating parents, foster and support the establishment of healthier nutrition and physical activity-related family conditions and individual habits for their child entering 7^{th} grade is inconclusive. The FNPA survey score is utilized in this study because a higher FNPA survey score indicates the presence of "family environments and behaviors" that are considered conducive to maintaining healthy weight in children [74]. In an analysis unadjusted for parent BMI and family income, Ihmels et al. report that children in households with the lowest FNPA survey

scores (lowest tertile) exhibit greater odds (OR: 1.7; 95% CI: 1.07-2.28) of having a BMI in the top 15%, compared to children in households with the highest FNPA survey scores (highest tertile) [74]. The FNPA survey score is a particularly useful measure in this context, as it contributes unique variance, independent of parent BMI and starting (child) BMI, in an adjusted model predicting child BMI change over a 1-year period in a longitudinal study [75]. In the present study, in unadjusted analysis, a higher hypothesized mean FNPA survey score is observed for the activist parent group (suggesting the presence of family conditions and individual habits more favorable to maintaining heathier weight in children), and the 1-sided t-test conducted at the alpha=0.10 level (more liberal significance level set post-hoc) indicates the presence of a nearly significant difference in mean FNPA survey scores between the parent groups ($p\text{-}_{value}$=0.101). However, when the effects of parent gender, parent income, and parent education are considered and adjusted for in a linear regression model, the association between parent subgroup membership and FNPA survey score is no longer observed (Table 6). Some doubt exists over whether this result can be considered conclusive due to the potential instability of the mean FNPA survey score calculated for the male activist (NME) GROUP (mean=59.6), which is based on only 5 respondents (Table 17).

Table 17: Mean FNPA Survey Score Stratified by Parent Gender and Parent Group Membership (Including Number in Each Group)

Subgroup by Gender	Number in Group	Mean Group FNPA Survey Score
NMEGROUP Female	19 (1 missing: total FNPA score could not be calculated due to missing data)	66.63
NMEGROUP Male	5	59.6
VACGROUP Male	10 (2 missing: total FNPA score could not be calculated due to missing data)	59.4
VACGROUP Female	14	64.79

In addition, and perhaps more importantly, if the mean FNPA survey score is assumed to be stable, parent gender cannot be conclusively ruled out as a potential effect modifier of the association between parent group membership and FNPA survey score. This doubt is based on the large standard error of 4.29 that is utilized in the test to evaluate whether the slope of the parent group membershipxmale parent interaction term of -1.65 is significantly different from zero. That is, inclusion of additional male activist parents in the sample could decrease the magnitude of this standard error and potentially change the significance level of the test.

A higher hypothesized mean FNPA physical activity sub-score is observed for the activist parents in this study (again suggesting the presence of healthier family conditions and individual habits conducive to maintaining healthy weight in children), and the 1-sided t-test conducted at the alpha=0.10 level (more liberal significance level set post-hoc) indicates the presence of a significant difference in mean FNPA physical activity sub-score between the parent subgroups ($p\text{-}_{value}$=0.07) in unadjusted analysis. However, when the effects of parent gender and family income are considered and adjusted for in a linear regression model, the association between parent subgroup membership and FNPA physical activity sub-score is no longer observed. Some doubt exists over whether this result can be considered conclusive due to the potential instability of the mean FNPA physical activity sub-score calculated for the male activist (NME) GROUP (mean=14.8), which is based on only 5 respondents (Table 18).

Table 18: Mean FNPA Physical Activity Sub-Score Stratified by Parent Gender and Parent Group Membership (Including Number of Parents in Each Group)

Subgroup by Gender	Number in Group	Mean Group FNPA Physical Activity Sub Score
NMEGROUP Female	20	17.2
NMEGROUP Male	5	14.8
VACGROUP Male	12	14.5

Table 18 (Cont'd)

VACGROUP Female	14	16.21

In addition, and perhaps more importantly, if the mean FNPA physical activity sub-score is assumed to be stable, parent gender cannot be conclusively ruled out as a potential effect modifier of the association between parent group membership and FNPA physical activity sub-score. This doubt is based on the large standard error of 1.85 that is utilized in the test to evaluate whether the slope of the parent group membershipxmale parent interaction term of -0.64 is significantly different from zero. That is, inclusion of additional male activist parents in the sample could decrease the magnitude of this standard error and potentially change the significance level of the test.

Conducting a larger study that includes additional male activist parents would likely resolve the above questions related to the: 1. Stability of the mean FNPA survey scores and FNPA physical activity sub-scores when considering the potential confounding effect of parent gender; and 2. Reliability of the standard errors when considering the role of parent gender as a potential effect modifier. A post hoc power analysis indicates that a much larger study total sample size of 226 parents, including at least 56 male activists, would be required to detect a significant difference of -2.63 in FNPA survey scores at the alpha = 0.05 level between the activist and fully vaccinating parent subgroups observed in this study (Table 19).

Table 19: Minimum Sample Size Required to Detect a Significant Difference in FNPA Survey Scores Observed in this Study between Activist and Fully Vaccinating Parents

Sample Size For Comparing Two Means

Input Data	
Confidence Interval (2-sided)	95%

Table 19 (Cont'd)

Power	80%		
Ratio of sample size (Group 2/Group 1)	1		
	Group 1	**Group 2**	**Difference***
Mean			2.63
Standard deviation	6.8	7.26	
Variance	46.24	52.7076	
Sample size of Group 1	113		
Sample size of Group 2	113		
Total sample size	226		

*Difference between the means

Results from OpenEpi, Version 3, open source calculator--SSMean

Further investigation with a larger sample size may be warranted, as other research focusing on assessing differences in general health or health-related behaviors unrelated to vaccination status between children of exempting parents and fully vaccinating parents appears scant, but the evidence that does exist is consistent with this study's hypothesis. In a medical chart review of 1,249 children in the United States, 24 months or younger or at age 6 with up-to-date or not up-to-date vaccination status, whose parents never refused or ever refused vaccination for them (for medical and personal belief reasons), Wei et al. report that children under age 2 whose parents ever refused vaccination for them exhibited significantly lower odds of an emergency room visit (OR: 0.80; 95% CI: 0.64-0.997), hospital stays of longer duration (OR: 0.22; 95% CI: 0.09-0.53), and outpatient visits (OR: 0.88; 95% CI: 0.79-0.98), compared to children under age 2 whose parents never refused vaccination for them [76]. In addition, Wei et al. report that a significantly higher percentage of children in the age 6 group whose parents ever refused vaccination for them were prescribed "antibiotics, asthma, or seizure

medications" [76, p. 5-7, open access version], compared to children whose parents never refused vaccination for them (93.48% v. 77.90%) [76, p. 5-6]. Taken together, the findings of Wei et al. are consistent with the notion that vaccine refusing parents exhibit greater confidence in caring for their children at home when their children face relatively minor ailments or injuries and greater confidence to advocate for increased utilization of medication when their children face more complex health challenges (e.g., managing asthma). As such, these combined findings appear aligned with this study's hypothesis that parents who intentionally refuse vaccination for their school-aged children due to personal belief objections reflect the healthism ideology of asserting higher levels of responsibility for and control over their children's health status to a greater degree than parents who elect to fully vaccinate their children.

Despite the above uncertainties surrounding the potential of parent gender to confound or modify the associations between parent group membership and FNPA survey scores or sub-scores, it seems clear that male activist and male fully-vaccinating parents who utilize vaccination-related services at their LHDs for their school-aged children exhibit lower FNPA survey scores or sub-scores compared to their female activist and female fully-vaccinating counterparts. This finding has potentially important public health implications. It can be deployed during the health encounter to effectively counter the: 1. High levels of distrust that female activist parents can exhibit in conventional medical/health authorities and 2. Suboptimal levels of trust that female fully-vaccinating parents can exhibit in conventional medical/health authorities when female activist and female fully exempting parents utilize vaccination-related health services at their LHDs (see Public Health Implications Chapter for

further elaboration). Increasing trust-levels in female activist parents theoretically can reduce existing NME rates and increasing trust-levels in female fully vaccinating parents theoretically can prevent future increases in NME rates.

Evaluation of this study's third hypothesis supports the notion that fully vaccinating parents (although most included in this study are not agnostics as originally assumed), compared to exempting parents, are more sensitive to, or more motivated by, the role that convenience plays in their vaccination-related decision-making for their school-aged children in Michigan in 2019, four years removed from the 2015 administrative rule change making NME filing less convenient in the state of Michigan (by requiring activist parents to first attend an educational session at their local HD). This result appears consistent with multiple studies reporting an association between complexity of NME filing procedures and NME rates [31][77][9][10][11], as easier or more convenient NME filing procedures are thought to influence parent vaccination-related decision-making by enticing some parents not holding strong anti-vaccine convictions into filing NMEs out of convenience, whereas more difficult or less convenient filing procedures are thought to remove this enticement and instead function as an inducement for these parents to fully vaccinate their children. For example, based on 1998 data, Rota et al. report a significant association between complexity of state NME filing procedures (high, medium, low) and state NME rates (high, medium, and low) in X^2 analysis [31]. In addition, Rota et al. explicitly link NME filing procedure complexity to parent decision-making about their child's vaccination status: "The existence of simple procedures for obtaining exemptions should have little bearing on most parents' decision to immunize. However, our results suggest that adherence to policies that require some effort on the part of the parent

may ensure that parent resolve to choose the exemption is deeply held and that such resolve is not a matter of convenience and does not stem from an impression that vaccination is no longer necessary" [31, p. 67]. In other words, while setting aside the question and implications of whether such an approach amounts to a sincerity of belief test, Rota et al. suggest that more complex or difficult NME filing procedures may act to influence parental decision-making about vaccination by steering them away from filing NMEs simply out of convenience. In a study conducted approximately 14 years later (based on 2011-2012 data), Blank et al. report a similar finding that states with difficult NME filing procedures exhibited lower NME rates (although Blank et al. do not appear to have conducted formal X^2 testing) [77]. Blank et al. also explicitly link NME procedural filing complexity to parent decision-making about their children's vaccination status: "In short, states with simpler exemption procedures have nonmedical exemption rates that are more than twice as high as rates in states with more complex exemption procedures. This result suggests that in many states in 2012 parents' decisions about whether or not to have their children immunized continue to be unduly influenced by matters of convenience – a phenomenon described by Rota and colleagues in 2001…" [77, p. 1287]. In this respect, Blank et al. are echoing the concern that easy NME filing procedures lead to increased NME rates, due to the tendency of some parents to select NMEs as the most convenient option (that is, more convenient than completing vaccinations for their children or retrieving a record of complete vaccination for their children).

Moreover, in a series of papers covering the period from 1991 to 2016, Omer et al. have consistently observed: 1. Significantly and non-significantly higher NME rates in states with the easiest NME filing procedures, compared to states with the most difficult procedures (from

approximately 2000-2016); and 2. Higher annual NME rate increases in states with easier exemption filing procedures, compared to states with the most difficult NME filing procedures (from 1991-2004, 2005-2011, and 2011-2012) [9][10][11]. Accordingly, Omer et al. recommend adjusting the complexity of NME filing as a strategy to reduce convenience-related NME filing: "States will be well served by enacting legislation that changes the balance of convenience in favor of vaccination away from exemptions…[11, p. 5][78]. Peterson et al. report a similar finding at the school district level that the perceived inconvenience of completing vaccinations for their school-aged children can influence parents to opt for the more immediately convenient option of filing NME exemptions (in states with easy filing procedures) to comply with immunization requirements. For example, in 2012, in Pierce County, Washington, after implementing school-based immunization clinics, the proportion of exempting parents in the district fell from 7.9% to 7.4% [79], indicating that some parents elected to file NMEs in the district "…for reasons of convenience rather than conviction…," according to Wang and colleagues [65].

Two studies directly assess the role of convenience in the decision-making process of parents responsible for the vaccination status of their school-aged children at the state level. In a Utah-based study (data collected in 2007-2008) that includes 287 exempting parents, Luthy et al. directly assess the role convenience plays in the decisions made by parents to obtain exemptions and immediate, unconditional school-entry for their children: "Over a quarter of the respondents [26.1%] indicated that they filed exemptions for convenience purposes, so their child could enroll in school" [80, p. 158]. Guidino et al. also directly assess the role of inconvenience by asking 288 exempting parents in Oregon from low, medium, and high rate

exemption areas with either skeptical/unfavorable vaccine perceptions or neutral/favorable vaccine perceptions: “Is it easier to enroll your child at school with an exemption [34],” but the results are difficult to interpret due to the potential ambiguity of the question. In other words, is the question asking; “did you file an exemption out of convenience so your child can attend school,” or “do you perceive that filing an exemption is the easier way to meet school immunization requirements than fully vaccinating your child?” Since the former question directly connects convenience to actual parent decision-making while the latter does not, each question potentially measures a different construct, making interpretation of the results challenging.

None of the above studies either directly or indirectly assessing the role of convenience in parent vaccination-related decision-making for their school-aged children: 1. Assesses the role that convenience plays in vaccination-related decisions-making in each of the activist and fully vaccinating parent subgroups and 2. Comparatively assesses the role of convenience in vaccination-related decision-making across the two parent subgroups. Such an approach was logical when these studies were conducted, as researchers at the time explored the hypothesis that some exempting parents likely opted for NMEs simply out of convenience, especially in states with easier or more convenient NME filing procedures. However, in a post-convenience 2020 NME filing environment in Michigan (the state “tightened” NME filing procedures in 2015), especially when considering the state-level evidence (marginally reduced NME rates) suggesting that the incentive to file NMEs out of convenience has been degraded in Michigan, it is logical now to assess the role of inconvenience in parent vaccination-related decision-making across parent subgroups, as inconvenience may still play a role in nudging vaccinating parents

previously unaffiliated with a strong high benefit/low risk or a strong high risk/low benefit vaccination-related prototype to move toward vaccination. In contrast, activist parents affiliated with a strong high risk/low benefit vaccination-related prototype are not as sensitive to the role of inconvenience in their decision-making about their child's vaccination status, as shown in this study, as these parents are likely acting more out of vaccination-related social-identity reinforced conviction than convenience in the Michigan post-convenience NME filing environment.

Evaluation of this study's third hypothesis also supports the notion that a significant difference exists between the fully vaccinating and activist parents in their levels of sensitivity to the role that social encouragement plays in parental decision-making about the vaccination-related status of their child entering 7th grade. However, the direction of this finding differs from the original hypothesis, which is surprising. That is, fully vaccinating parents, not activist parents, exhibit greater sensitivity to the role of social encouragement in decision-making related to the vaccination status of their school-aged child. While this social encouragement-related result appears consistent with the convenience-related result in that fully vaccinating parents previously unaffiliated with a strong favorable or unfavorable vaccination-related prototype may respond in a similar fashion to each nudge stimuli (resulting in movement toward vaccination), the possibility of the existence of a shared underlying mechanism – that avoidance of inconvenience or receptivity to social pressure could both function to nudge parents uncommitted to a strong vaccination-related social identity in the direction of vaccination – was not considered a priori. The original hypothesis assumed that activist parents, not fully vaccinating parents, would exhibit greater sensitivity to the role of social

encouragement and social support in their decision-making about their children's vaccination status, based on the assumption that activist parents derive the basis of their vaccination-related social identity through close identification with other vaccine delaying and/or refusing parents who share a strong affiliation with a high risk/low benefit vaccination-related prototype.

It is possible that this assumption regarding the origin and nature of the vaccination-related social identity of activist parents is simply false and therefore unworthy of further research consideration. It is also possible that the survey questions: "Encouragement from other people is important to me when I consider my child's shots." (social encouragement measure) and "I worry about losing support from, or jeopardizing my relationships with, people close to me if I change my opinion about my child's shots." (social support measure) failed to directly engage the social identity of the activist parents. Furthermore, it may be possible that the presence of an unengaged social identity bound strongly to a high risk/low benefit vaccination-related prototype muted the possible effects of social encouragement and minimized the potential of social identity threat for activist parents when asked to consider their child's shots or to change their opinion about their child's shots. These two survey questions may too imprecisely define the source of social encouragement as "other people" and the source of social support as "people close to me" to effectively invoke consideration of vaccination-related social identity in activist parents. That is, since "other people" and "people close to me" may not be interpreted to focus exclusively on people who share the same convictions about school-aged vaccination as the activist parents, activist parents may feel comfortable ignoring social encouragement from "other people" and may not worry about the

potential interpersonal fallout of losing social support from people close to them because these people may not make a material contribution to their vaccination-related social identity in the first place. It is also possible that activist parents feel unconditionally supported by close relations irrespective of their children's vaccination status.

Hypothetically, the construct validity of the social encouragement and social support measure can be enhanced by modifying both questions to more explicitly, and therefore more directly, engage the vaccination-related social identity of activist parents. For example, the social encouragement question can be modified as follows: "I am open to encouragement from people who do not share my beliefs about vaccination when I consider my child's shots," with the aim of stimulating a response from activist parents based on their vaccination-related social identity. In other words, asking activist parents with a vaccination-related social identity, based on strong fidelity to a low benefit/high risk vaccination-related prototype, to consider encouragement from other people with favorable predispositions toward school-aged vaccination hypothetically should stimulate a defensive response in activist parents and cause them to disagree or strongly disagree with the measure. In contrast, fully vaccinating parents, hypothetically devoid of a vaccination-related social identity and therefore unbound to a strong vaccination-related prototype (based on the assumption that no "pro-vaxxer" analogue movement exists in similar scope to the anti-vaxxer movement), should respond less defensively to the idea of considering potential encouragement from people holding unfavorable vaccination-related views and therefore should express significantly less disagreement with the modified form of this question. Similarly, the social support measure can be modified as follows: "I worry about losing support from, or jeopardizing my relationships

with, people who share my beliefs about vaccination if I change my opinion about my child's shots," with the aim of more directly engaging the vaccination-related social identity of the exempting parents. In other words, activist parents who hypothetically maintain a vaccination-related social identity should express greater concern over potentially losing social support from other members of their peer group sharing unfavorable vaccination-related beliefs, compared to fully vaccinating parents who are less affiliated with a strong vaccination related prototype and therefore do not rely as heavily on members of a peer group sharing favorable vaccination-related beliefs as a source of vaccination-related social identity.

The surprise finding that activist and fully vaccinating parents express similarly high strong beliefs in their child's "shots" appears to contradict the idea that activist parents are wed to a strong vaccination-related prototype that forms the basis of a unique vaccination-related social identity, while the fully vaccinating parents remain largely unaffiliated with a strong vaccination-related prototype linked to a unique vaccination-related subgroup social identity of their own. This shot belief measure, "I have strong beliefs about my child's shots," was originally conceptualized as a healthism proxy measure. Interpretation of this strength of shot belief question relative to social identity considerations is therefore problematic because the question does not explicitly link strength of belief to the subgroup prototype of activist parents or fully vaccinating parents (after receiving a nudge toward vaccination). A potentially more informative and reliable question related to social identity would explicitly link strength of belief with the source of that belief – in this case, to the prototypes that form the central defining characteristics of the parent subgroups (i.e., low benefit/high risk of vaccination for exempting parents or high benefit/low risk of vaccination for fully vaccinating parents).

Another possibility not considered in this study is that stereotype threat, a type of social identity threat based in this case on gender, is contributing, at least in part, to the decision-making process of a unique subset of female parents who deny vaccination for their school-aged children. As his central thesis, Navin asserts that vaccine denialism "is an alternative epistemological space" represented by a subgroup of vaccine-refusing parents who uniquely exhibit a well-defined set of epistemic virtues and vices [46]. Specifically, he argues that vaccine denialists should be:

1. Credited for their epistemic virtues, for fostering cooperation between "parent researchers" and for fostering teamwork between themselves and health professionals, and
2. Faulted for their epistemic vices, for uncritically accepting beliefs about vaccination unsupported by evidence-based inquiry and for not recognizing competency differences between themselves as untrained lay persons and health professionals.

Navin asserts that the blameworthiness of female vaccine deniers for their epistemic vices should be mitigated due to the likelihood that they experience stereotype threat in the medical encounter when pediatricians challenge their competency to make scientifically valid vaccination-related decisions for their school-aged children. Moreover, Navin argues that this type of stereotype threat ("that women are bad at science") carried out by implicitly biased pediatricians (both male and female) in gendered medical encounters can inadvertently exacerbate the very vaccine denialism that pediatricians are seeking to avoid by driving female vaccine deniers away from conventional medical/health authorities toward less implicitly biased conventional and alternative practitioners.

> Women who have frequently been subjected to stereotype threat may attempt to avoid conditions that require demonstration of scientific knowledge. Among other things, they seek out vaccine denialism so as to avoid confrontations with pediatricians about the science of vaccines, confrontations in which they may frequently be subject to stereotype threat [46, p. 165].

Momentarily setting aside the question of whether female parents denying vaccination to their school-aged children experience stereotype threat in the medical/health encounter, it is unclear whether the epistemic virtues and vices attributed by Navin are unique to a subset of vaccine deniers. For example, investigator parents who ultimately elect to fully vaccinate their school-aged children likely seek out active partnerships with medical and health professionals. In addition, these parents, as part of their deliberative research process, also likely engage with other parents who both accept and refuse vaccination for their school-aged children. However, these efforts may not draw as much attention as the efforts of vaccine denying parents because investigator parents make vaccination-related decisions that ultimately fall in line with the recommendations of conventional medical/health authorities.

It is also unclear whether vaccine denying parents reject differences in professional competency differences between themselves and medical/health authorities. For example, in the present study, a surprising proportion of activist parents exhibit trust in the recommendations of conventional medical/health authorities. However, it does seem clear that the vaccine deniers characterized by Navin do practice uncritical acceptance of anti-vaccination beliefs, but a counter-argument can be made that this phenomenon is not evidence that vaccine denialism represents “an alternative epistemological space,” but rather a unique social identity defined by strong fidelity to a high risk/low benefit vaccination-related prototype. Navin himself hints at the possible role of social identity in vaccine denialism

without explicitly evoking the concept when considering additional phenomena that can be viewed as mitigating the blameworthiness of vaccine-denying parents:

> Also, many of the parents who do not want to reason with physicians, or who no longer consider them to be medical experts, may have developed confidence about their views about vaccines after numerous online and in-person discussions with fellow vaccine denialists. They may (believe that they) have already given sufficient consideration to the reasons in favor of vaccination (46, p. 262).

Navin's analysis appears to suggest that vaccine deniers are so strongly wed to an anti-vaccination social identity that it is not possible for them any longer to consider a pro-vaccination alternative. In other words, vaccine denying parents appear to share a unique subgroup identity that functions to prop up and reinforce the central defining characteristic of a social identity devoted to a high risk/low benefit vaccination-related prototype.

The focus on the epistemic virtues and vices of a unique class of vaccine denying parents leads Navin to the belief that the epistemic vice of ignoring evidence-based vaccine recommendations can be addressed with correcting information.

> …public health advocates ought to highlight the poor epistemic practice that vaccine denialists embrace. This is likely to assist in broader efforts to undermine the appeal of vaccine denialism. Advocates for routine childhood vaccination ought to argue that vaccine denialists are committed to false beliefs about the safety and efficacy of vaccines and poor practice for reasoning about the safety and efficacy of vaccines [46, p. 245].

However, decades-long efforts to falsify the persistent beliefs of vaccine denialists have not yielded positive results in the generally low trust environment that characterizes the intergroup relationship between protesting parents and conventional medical/health authorities. Therefore, a shift in perspective is needed from attempting to falsify the seemingly unfalsifiable vaccination-related convictions of vaccine protesting parents to a new perspective that seeks to

reduce bias and increase trust between vaccine deniers and medical/health professionals by addressing the social-identity related needs of vaccine-protesting parents.

Returning to the important question of whether female vaccine denialists experience gender-based stereotype threat in the medical encounter, Navin makes an important contribution by recognizing that this counterproductive phenomenon can occur. Based on Navin's observation, it is theoretically possible that stereotype threat and social identity threat can occur simultaneously in the mandatory waiver educational session that female activist parents are required to attend prior to filing NMEs for their school-aged children in Michigan. The occurrence of stereotype threat in the mandatory educational session would be expected to intensify the defensiveness provoked by social identity threat in female activist parents (based on their commitment to vaccine opposition) or vice versa and further compromise the quality of the intergroup relationship between these parents and public health professionals as a result. However, the results of this study can be potentially employed to tamp down gender-related social identity threat and vaccine opposition-related social identity threat in female activist parents who utilize vaccination-related services at their LHDs. That is, public health professionals in waiver education sessions can simultaneously directly affirm the gender-related social identity and indirectly affirm the vaccination-related social identity of female activist parents by pointing out that female activist parents and female fully vaccinating parents, compared to their male counterparts, excel on average as competent managers of their family's non-vaccination-related health behaviors. These affirmations theoretically are likely to reduce levels of defensiveness exhibited by female activist parents and increase intergroup trust levels between these parents and public health professions during waiver

education sessions (see Public Health Implications Chapter for further elaboration). In contrast, this study offers no results that can be likewise deployed to indirectly affirm the unique subgroup identity of male activist parents. The search for a novel way to indirectly affirm the social identity of these parents may be redirected in future studies now that a general approach has been established.

Discussion Conclusion

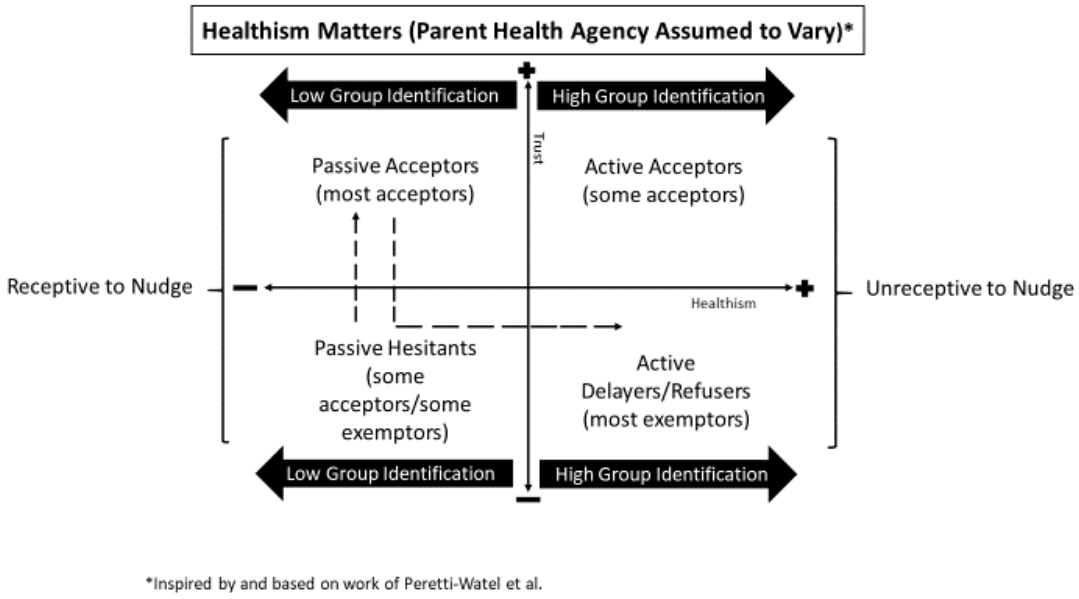
This study's exploration of potential interactions between the role of social identity, trust, and healthism – as inconclusive as the results may be – potentially offers an enhanced theoretical framework for better understanding the decision-making architecture of parents responsible for the vaccination status of their school-aged children. Model 1, which largely draws upon the work of Peretti-Watel et al., assumes utilization of a biased healthism measure in this study that failed to detect true significant variation in healthism expression between activist and fully vaccinating parents. It is based on two dimensions of trust, trust in conventional medical/health authorities and trust in vaccines, for simplicity sake, but trust can be even more precisely conceptualized in this model by defining trust in its 4 most prominent dimensions: 1. Trust in the competency of medical/health authorities, 2. Trust in the integrity of medical/health authorities, 3. Trust in vaccines, and 4. Trust in the wider healthcare-delivery system. And finally, this model also incorporates the work of social identity theorists. In this model:

1. The majority of fully vaccinating parents can be categorized as passive, non-social-identity-driven acceptors, characterized by relatively low social identity subgroup

affiliation, relatively low healthism (internal locus of control) expression, relatively high trust in conventional medical/health authorities, and relatively high trust in vaccines.

2. Some fully vaccinating and some exempting parents can be categorized as passive, non-social-identity-driven hesitants, characterized by relatively low social identity subgroup affiliation, relatively low healthism (internal locus of control) expression, and relatively low trust in conventional medical/health authorities and/or relatively low trust in vaccines.
3. The majority of exempting parents can be categorized as active, social-identity-driven delayers and/or refusers, characterized by relatively high social identity subgroup affiliation, relatively high healthism (internal locus of control) expression, and relatively low trust in conventional/health authorities and/or relatively low trust in vaccines.
4. Some parents can be categorized as active, social-identity-driven acceptors, characterized by relatively high social identity subgroup affiliation, relatively high healthism (internal locus of control) expression, relatively high trust in conventional medical and health authorities, and relatively high trust in vaccines [See Figure 6].

Figure 6: Model 1 (Healthism Matters)



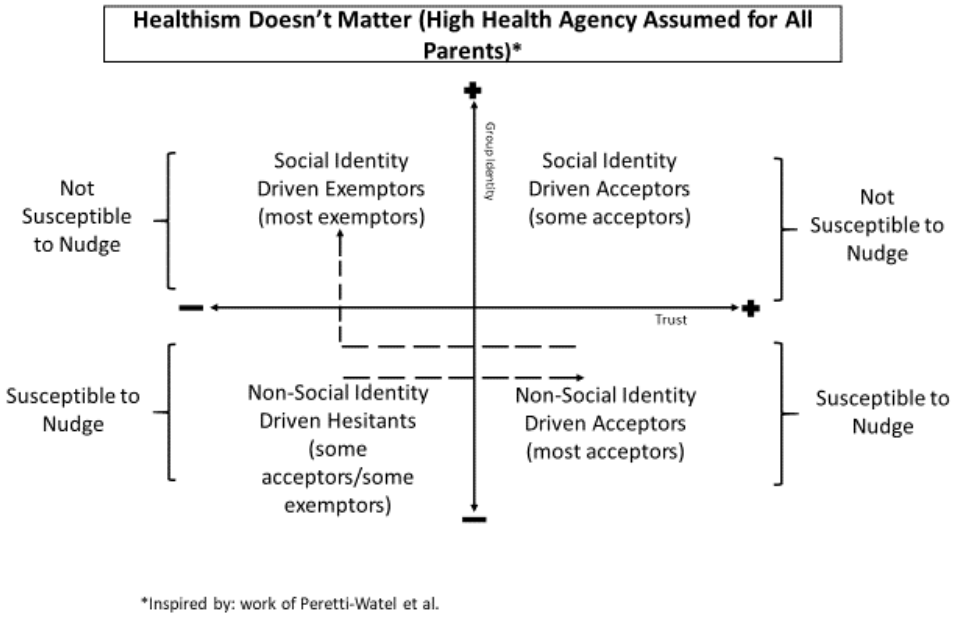
*Inspired by and based on work of Peretti-Watel et al.

Model 2 draws on the work of Peretti-Watel et al. in a more limited sense. This model assumes utilization of a reliable healthism measure in this study and the ubiquitous presence of healthism in northern lower Michigan. It is based on two dimensions of trust, trust in conventional medical/health authorities and trust in vaccines, for simplicity's sake, but trust can be even more precisely conceptualized in this model by defining trust in its 4 most prominent dimensions: 1. Trust in the competency of medical/health authorities, 2. Trust in the integrity of medical/health authorities, 3. Trust in vaccines, and 4. Trust in the wider healthcare-delivery system. Model 2 also incorporates the work of social identity theorists. In the model:

1. The majority of fully vaccinating parents can be categorized as non-social-identity-driven acceptors, characterized by relatively low social identity subgroup affiliation, relatively high trust in conventional medical/health authorities, and relatively high trust in vaccines.

2. Some fully vaccinating and some exempting parents can be categorized as non-social-identity-driven hesitants, characterized by relatively low social identity subgroup affiliation, and relatively low trust in conventional medical/health authorities and/or relatively low trust in vaccines.
3. The majority of exempting parents can be categorized as social-identity-driven delayers and/or refusers, characterized by relatively high social identity subgroup affiliation, and relatively low trust in conventional medical/health authorities and/or relatively low trust in vaccines.
4. Some parents can be categorized as social-identity-driven acceptors, characterized by relatively high social identity subgroup affiliation, relatively high trust in conventional medical and health authorities, and relatively high trust in vaccines [See Figure 7].

Figure 7: Model 2 (Healthism Does Not Matter)



Model 1 and Model 2 can illuminate the mechanism by which full-vaccinating parents potentially move toward hesitancy or exemption and therefore can shed new light on the phenomenon of exemption clustering (when parents who file NMEs for their school-aged children tend to concentrate in the same area), which is not fully understood [81]. Chung et al. report evidence that the social circle of vaccine delaying or refusing parents with young children (<7 years of age), compared to vaccinating parents with young children (<7 years of age), is more likely to be occupied by another person who also has refused vaccination, which suggests that social identity-related considerations potentially play a more prominent role than previously thought in vaccination-related decision-making among parents responsible for the vaccination-related status of their school-aged children.

> Finally, significant effects among personal networks were identified. Parents who delayed or refused vaccine(s) were more likely than acceptors to report knowing someone who refused, delayed, or had a child who experienced a severe vaccine reaction, most of whom were friends, family members, and themselves. It is possible that for some parents their networks helped shape immunization decisions, while for others they may have chosen networks with individuals holding similar values (Nickerson 1998) [82, p. 2185].

Whether vaccine delaying or refusing parents "choose" the social network or whether the social network "chooses" the vaccine delaying or refusing parent, the ultimate membership-induced outcome potentially evidences a pre-dispositional drive in these parents to establish and/or maintain the positive distinctiveness of a unique subgroup identity characterized by a strong affiliation to a low-benefit/high-risk vaccination-related prototype. Consistent with this notion that social identity considerations influence the vaccination-related decisions that parents make for their school-aged children, the findings of this field study indicate that perhaps most fully vaccinating parents, characterized in Model 1 as passive, non-social-identity-driven

acceptors and in Model 2 as non-social-identity-driven acceptors, are relatively unaffiliated with a strong vaccination-related social identity and therefore receptive to convenience and social encouragement-based nudges (moving them toward vaccination). However, these nudges hypothetically can also function to move some fully vaccinating parents with lower trust predispositions (a profile observed in this study) toward greater expressions of vaccine delay and/or refusal. Similarly, some fully vaccinating parents and some activist parents, characterized in Model 1 as passive, non-social-identity-driven hesitants and in Model 2 as non-social-identity-driven hesitants hypothetically are even more susceptible to being nudged toward exemptions due to their lower trust predispositions. In contrast, most activist parents, characterized in Model 1 as active, social-identity-driven delayers and/or refusers and in Model 2 as social-identity-driven delayers and/or refusers, and some fully vaccinating-parents, characterized in Model 1 as active, social-identity-driven acceptors and in Model 2 as social identity acceptors, hypothetically are not receptive to, or susceptible to, the effects of nudges due to the presence of vaccination-related social identities that rely on high fidelity to vaccination-related prototypes.

Chapter 7: Public Health Implications of a Social Psychological Approach to Increasing Trust but Not Agency between Parents Responsible for the Vaccination Status of Their School-Aged Children and Conventional Medical/Health Authorities

Interventions aimed at addressing the social identity-related needs of parents resistant to, or opposed to, school-entry vaccination appear rare. Reavis et al. deployed and assessed a self-affirmation intervention aimed at meeting the *personal* identity-related needs of parents opposed to vaccination [45]. This self-affirmation intervention failed in reducing defensiveness to identity-threatening pro-vaccination health messaging. While this intervention was not targeted at meeting the *social* identity-related needs of these parents per se, given that personal and social-identity determinants are so closely bound together at the conceptual level, careful examination of Reavis et al.'s findings potentially yields new insights, especially when considered in light of other self-affirmation interventions that succeeded in reducing defensiveness to identity-threatening messaging in health domains unrelated to vaccination (smoking and fruit and vegetable consumption) [83][84]. Insight 1: Why self-affirmation theoretically may not work on activist parents (e.g., it may increase agency in these parents already high on the agency, or healthism, scale and high on the distrust scale, as observed in this study). Insight 2: Why an intervention designed to meet the social identity needs of activist parents ideally and necessarily should avoid attempting to increase parent agency in a low trust environment and instead work exclusively to reduce parent bias against (and related distrust of) conventional medical/health authorities and vaccine manufacturers.

To begin exploring these insights, it is first necessary to understand the functioning of the "self-system." Self-affirmation appears to reduce defensiveness to the otherwise identity-threatening impacts of health messaging in non-vaccination related health contexts by

positively engaging the self-system that functions to protect human psychological self-integrity. The self-system operates at two levels: the subordinate level (lower level) and the superordinate level (upper level) [85]. The lower level is comprised of well-defined and diverse sources of personal identity (e.g., a generous personality) and social identity (e.g., political party affiliation) that feed up to and comprise a more inclusive and flexible upper level [85]. This more inclusive and flexible superordinate level that closely links together sources of personal and social identity protects global self-integrity by shifting psychological focus away from a threatened source of personal or social identity by affirming another unrelated source of personal and social identity at the subordinate level [85].

> The self-affirmation analysis of such collective (group) threats, however, asserts that because social identities are only one part of a larger, flexible self-system, people can respond to threats to their group memberships or social identities indirectly. That is, they can maintain an overall self-perception of worth and integrity by affirming some other aspect of the self, unrelated to their group [85, p. 206].

In other words, when group identity is threatened, the self-system can maintain the global self-integrity of individual group members by shifting focus away from a threatened aspect of group identity that is under scrutiny to a more personal-related identity source that serves an affirmative function. Presumably, given its flexibility, the self-system can also work the other way: when a source of personal identity is threatened, the self-system can shift focus away from the personal identity source that may be under attack to a group identity source that provides a more affirmative contribution to human (psychological) self-integrity.

When health information threatens to negate one identity source and thereby destabilize the overall self-concept of an individual, self-affirmation can compensate for the negated identity source and restore the stability of the overall self-concept by affirming a

different core identity domain [85]. Harris et al. provide the theoretical basis of self-affirmation and provide an example of how it may work in smokers facing identity threatening anti-smoking health messages.

> In experimental research on self-affirmation people are asked to think about an important aspect of their self-concept (e.g., a core value). Such manipulations are derived from Self-Affirmation Theory, which posits that a) people resist information that threatens their sense of being rational, morally adequate, and in control of important outcomes, but b) bolstering their sense of self-adequacy or "self-integrity" in one domain can offset threat and reduce motivation to resist information in another domain (Sherman and Cohen, 2006, Steele, 1988). For example, a smoker reminded of the dangers of smoking faces not only a physical threat but as an agent of such risky behavior – a threat to her sense of self-adequacy. By reassuring herself she is self-adequate through self-affirming in another domain (e.g., by thinking about her generosity), she is able to process information about smoking more open-mindedly (Sherman and Cohen, 2006, Steele, 1988) [84, p. 370].

Self-affirmation interventions have been shown experimentally to decrease resistance to positive, benefit-focused health messages promoting behavioral changes in health domains unrelated to vaccination for self-affirmed subjects, compared to subjects not self-affirmed (who experience unbuffered identity threat upon receipt of the health messaging). For example, Harris et al. report that self-affirmed subjects exhibited greater fruit and vegetable consumption after receiving health messages promoting the benefits of fruit and vegetable consumption, including the benefits to heart health, compared to non-affirmed subjects receiving the same health messages [84]. In addition, self-affirmation interventions have been shown experimentally to reduce defensive resistance to negative, consequence-focused health messages and increase intentions to change unhealthy behavior in health domains unrelated to vaccination for self-affirmed subjects, compared to subjects not self-affirmed. For example, DiBello et al. report that self-affirmed heavy smokers (either in the high or low self-affirmation

experimental conditions) exhibited reduced defensiveness to negative anti-smoking messages through greater threat perception, compared to heavy smokers not self-affirmed [83]. In addition, DiBello et al. report that highly self-affirmed heavy smokers exhibited increased intention-to-quit (smoking), compared to heavy smokers not self-affirmed [83].

In contrast, self-affirmation interventions have been shown experimentally to *reduce* intentions to change health-compromising behaviors in vaccination-related domains for self-affirmed subjects compared to subjects not self-affirmed. Reavis et al. in an experimental series report that parents with initial negative vaccination attitudes who underwent a self-affirmation exercise (and received no correcting information disavowing the link between vaccination and autism) exhibited reduced intentions to vaccinate, compared to parents who did not participate in a self-affirmation exercise (and received no correcting information refuting the vaccination-autism link). In their Study 1, Reavis et al. report the following result: "For participants with initial negative vaccine attitudes, values affirmation *decreased* intentions to vaccinate in the absence of correcting information [i.e., the control passage condition] and had no effect in the presence of it [i.e., the autism correction passage]" [45, p. 7]. For their study 2, Reavis et al. report: "Condition had no effect on those with relative positive vaccine attitudes (M=5.66 for both conditions), but for those with initial relative negative vaccine attitudes, their intention to vaccinate was lower in the self-affirmation conditions (M=3.06, SE=0.16) compared to those in the control condition (M=3.78, SE=0.17)" [45, p. 9].

Self-affirmation appears therefore to result in discrepant findings, including:

1. Reduction in defensive reactions to positive health messages unrelated to vaccination that result in healthy behavior change;

2. Promotion of greater receptivity to negative health messages unrelated to vaccination that results in increased intention-to-change unhealthy behaviors; but
3. Provocation of the opposite effect of decreased intention-to-vaccinate in parents with unfavorable predispositions toward vaccination.

However, these discrepant findings beg an important question: could the underlying self-affirmation mechanism provoke differential responses in individuals experiencing identity threat in response to positive and negative health messages unrelated to vaccination and in individuals with negative vaccination-related predispositions experiencing identity threat in response to health messages related to vaccination? A clue may be found in the work of Schmeichel and Vohs who have experimentally shown that self-affirmation may work by increasing levels of self-control in ego-depleted subjects who otherwise are not able to avoid mounting defensive reactions to self-threatening information [86] and to recover compromised levels of self-control: "The benefits of self-affirmation extend beyond assuaging a threatened self-concept to enabling good self control" [86, p. 780]. In addition, Harris et al. report experimental results that self-affirmed smokers exhibit significantly higher levels of self-control, and significantly higher levels of self-efficacy, than non-affirmed smokers [87]. Employing self-affirmation to reduce levels of defensiveness to positive and negative health messages in smokers and to increase levels of self-control in smokers struggling to quit is a potentially powerful combination of effects. However, increasing levels of self-control through self-affirmation in activist parents who already bring high levels of self-control or agency (healthism) into the medical/health encounter, as observed in this study, and who simultaneously bring high levels of distrust of conventional medical/health authorities and/or vaccines themselves to

the health/medical encounter, also as observed in this study, is another matter altogether and may serve only to reinforce the determination of activist parents to actively delay and/or refuse vaccination for their school-aged children.

If current attempts to falsify the vaccination-related beliefs of exempting parents in medical/health encounters are likely to provoke identity threat and result in a counterproductive increase in the strength of these beliefs – and if the only currently available identity-related intervention, self-affirmation, also likely functions to counterproductively reinforce the vaccination-related beliefs of exempting parents in the medical/health encounter – an alternative, potentially more productive approach, based on social identity and social categorization theory, requires fundamentally re-imaging the nature of the waiver education session that activist parents are required to attend at their LHD in Michigan prior to filing NMEs for their school-aged children. First, the primary objective of the reimagined health educational encounter should move beyond the conventional focus on the falsification of negative vaccination-related beliefs to avoid inadvertently triggering personal or social identity threat (including stereotype threat based on gender) in activist parents. Instead, new emphasis should be placed on inducing a common, superordinate identity while simultaneously affirming nested subgroup identities either directly or indirectly when possible to reduce bias and increase trust between activist parents and public health professionals since distrust appears to be the critical factor observed in this study driving a wedge between activist parents and medical/health authority subgroups.

Inducement of a shared, superordinate identity has been shown to reduce bias in a diversity of experimental and real-life intergroup settings, according to Gaetner and Dovidio (in

a chapter review of their personal and professional journey exploring the potential utility of, and potential limitations associated with, “The Common Ingroup Identity Model” in intergroup bias reduction) [88]. In addition, over the course of their chapter review, Gaetner and Dovidio: 1. Identify, describe, and review the merits of other social-identity related models, and associated interventions that have been shown to potentially reduce bias between subgroups and 2. Discuss the potential pitfalls related to each alternative approach [88]. As part of their review and assessment of other approaches, Gaetner and Dovidio review the potential advantages of the Mutual Differentiation Model (MDM); they view it as complementing the Common Ingroup Identity Model, as it allows for former subgroup identities to remain prominent with the simultaneous inducement of a shared, superordinate identity category [88], which is important in reality contexts where the maintenance of unique subgroup identities is desirable/beneficial or where the strength of subgroup identification prohibits re-categorization strictly in terms of a new common, superordinate identity. The MDM is particularly relevant in the context of school-entry immunization requirements, as activist parents may be unlikely to completely abandon their unique social identity, based on their seemingly strong commitment to a low benefit/high risk vaccination-related prototype, in the face of re-categorization efforts that focus exclusively on establishment of a new superordinate shared identity category. This study’s finding that female activist and female fully vaccinating parents on average appear to excel at promoting non-vaccination related healthy behaviors in their school-aged children and in establishing family environments that support these healthy behaviors could be utilized in the medical/health encounter as a new messaging strategy to indirectly affirm the subgroup

identity of these parents without directly affirming their unfavorable predispositions toward vaccination (which is antithetical to the public health mission).

However, great care must be taken in attempts to induce a common superordinate identity that can reduce bias and enhance trust between exempting parents exhibiting a strong commitment to a low benefit/high risk vaccination-related subgroup prototype and traditional medical/health authorities exhibiting a strong commitment to a high benefit/low risk vaccination-related subgroup prototype. This superordinate identity should not inadvertently set off an intergroup process that could actually increase, *not decrease*, intergroup bias and distrust. Efforts to establish a common superordinate identity can backfire through a multi-step process known as ingroup projection (following the Ingroup Projection Model): 1. Establishment of a shared superordinate identity can threaten the distinctiveness of the majority subgroup (ingroup), 2. The threatened subgroup can respond by projecting its subgroup prototype on to the new shared superordinate identity category, and 3. The majority subgroup subsequently can utilize the "captured" new common superordinate identity category as an evaluative frame to negatively assess the former outgroup [41]. Authors of multiple studies report evidence of ingroup projection or related processes [41][89][90][91], including a meta-analysis reporting a significant increase in intergroup bias across multiple studies in which a common superordinate identity is made prominent [92]. However, multiple studies also suggest that intergroup bias is only increased when a *simple* superordinate identity is made prominent and that intergroup bias can be reduced when a complex or unrelated superordinate identity prototype is introduced, as the presence of a more "uncapture-abley"

complex or unrelated superordinate prototype is thought to inhibit the process of prototype projection by the former ingroup [41][89][90][91].

While taking care to acknowledge the existence of potentially bias-inducing ingroup processes that can be activated to protect the prototypical distinctiveness of subgroups experiencing distinctiveness threat (ingroup projection in the context of a prominent common superordinate identity category can be viewed as such a process), Gaetner and Dovidio point to the work of Riek et al. as an example of an experiment-based common identity approach that has been shown to reduce intergroup bias between Republicans and Democrats in the United States by minimizing the potential of intergroup distinctiveness threat in the first place [88]. Riek et al. experimentally induced a common superordinate identity for Democrats and Republicans through a multi-step process:

- First, researchers activated political party affiliation and induced formation of unique political party-based subgroups asking two Democrats to work together and two Republicans to work together in separate groups on a 5-minute task listing ten (preselected?) political issues in order of national (American) importance according to their respective subgroup's political-party orientation; and
- Second, researchers induced formation of a common one group identity by asking the two Democrats (representing a unique subgroup identity) and the two Republicans (also representing a unique subgroup identity) to come together to form one larger group, to sit in an alternating pattern (D-R-D-R) at a round table, to adopt an "America Group" name, to put on a t-shirt with an American flag prominently featured on its front, and to

> engage in a 8-minure collective task generating a list of responses to the question, "Why America was [is] good?" [93].

This common group task was designed to foster group interdependence, reinforced by offering a potential monetary reward if the "quantity and creativity" of the group's output was judged superior to other groups [93]. Riek et al. report that the one-group experimental condition, compared to the two-group condition (in which Democrats and Republicans worked in a more separate fashion), significantly reduced levels of real and symbolic threat between Democrats and Republicans, which, in turn, increased positive intergroup perceptions [93]. Reduction of symbolic threat is particularly relevant to the division between activist parents and conventional medical/health authorities, as symbolic threat can emerge from the existence of underlying value conflicts [93]; the bias-reducing benefits of threat reduction between a relatively small number of activist parents and conventional medical/health authorities can potentially extend well beyond the medical/health encounter into the wider community population.

> The mediation models also contribute to our understanding of how reductions in threat occur and impact general outgroup attitudes. Our final model suggests that the common ingroup identity first improves attitudes toward present outgroup members. These improved attitudes then make the outgroup less threatening, which improves the overall attitude toward the outgroup. Therefore, a small intervention with a few outgroup members can have a generalizing effect on general outgroup perceptions by first reducing threat [93, p. 418].

In addition, Riek et al. explicitly link intergroup threat reduction to intergroup trust enhancement:

> These findings also have implications for issues of intergroup trust. One possibility is that intergroup threat is likely to increase distrust among members of different groups, a reduction in intergroup threat may have positive effects on intergroup trust. Another possibility is that an increase in trust precedes

> reductions in threat. Perhaps the presence of a common ingroup identity increases intergroup trust, which in turn reduces intergroup threat [93, p. 420].

Inducement of a common one group identity therefore is a promising, yet underutilized approach to addressing the low trust levels that currently exist between activist parents and conventional medical/health authorities, and low trust levels in vaccines (presumably representing low trust levels between activist parents and vaccine manufacturers) – as observed in this study – which appear to weigh heavily on the decision-making process of parents electing to file NMEs for their school-aged children. A note of caution is necessary when interpreting these results: Riek et al. themselves warn against the possibility that ingroup projection processes could function (in the presence of two subgroups with highly identified prototypes) to undermine the bias reducing and trust enhancing effects of the common ingroup approach and backfire to actually increase levels of intergroup bias [93].

While respecting the caution of Riek et al., creation of a common one group identity aimed at reducing bias and increasing trust between activist parents and public health authorities in the waiver education session that parents are required to attend at their LHD in Michigan prior to filing NMEs for their school-aged children can be further informed by the work of Gaetner et al. who experimentally first (successfully) induced subgroup identification and then successfully reduced levels of intergroup bias through establishment of a shared superordinate identity in a group of undergraduate students. More specifically, Gaetner and colleagues induced a one group identity by instructing student volunteers to sit in an integrated seating arrangement, create a new name for their integrated common group (specifically not derived by combining their former subgroup names), engage in a common group discussion to generate the best possible solution to the "Winter Survival Problem," and rely on each other to

qualify for a lottery reward for the teams producing the best solutions (compared to other "teams" at a different location that did not actually exist) [94]. In addition, students in the one group condition were told that their group's solution was judged superior to the solutions generated by the other groups in the one group condition (which did not actually exist) prior to completing the study's surveys [94]. Providing feedback at that specific time was intentionally designed to reinforce the prominence of the one group condition [94]. Drawing upon this example, any common-identity intervention designed to reduce bias and increase trust between activist parents and representatives of the medical/health communities and vaccine manufacturers therefore should seek to establish a common ingroup identity based on the careful establishment of intergroup interdependence.

Perhaps most germane to increasing trust levels between activist parents and conventional medical/health authorities through a common identity approach rooted in social psychology, Penner et al. report evidence of significant increases in trust expressed by African American patients in their non-black physicians (predominantly of Asian ethnicity) at 4-weeks post-intervention and 16-weeks post-intervention after receiving an intervention during medical encounters (appointments) that encouraged both patients and physicians to approach their work together as "playing on the same team" [95]. In this study, physicians (along with their paired patients) "were randomly assigned to either the common ingroup identity condition (N=7) or the general health information condition (n=7)" [95, p. 1144-45]. In the common ingroup identity experimental group, researchers attempted to induce a shared superordinate identity by having physicians and patients: 1. Read and sign a contract agreeing to work as a team during the medical appointment; 2. Wear a button with a common team

color during the medical appointment; and 3. Display their button with the name of the clinic and the logo of the clinic (including "schematic figures holding hands" [95, p. 1142]) during the medical appointment [95]. In addition, patients were given a pen in the color of their team, with a printed team name based on color (e.g., "Team Blue") and a printed name of the clinic on it [95]. Moreover, physicians and patients were given a set of ten suggestions to guide them in formation of a common ingroup identity that were also posted on the wall of the examination room:

"Text Box. Team Suggestions to Physicians and Patients

1. Remember, you are a team. Both of you are responsible for what happens today.
2. Do everything you can to answer questions as completely as possible.
3. Do everything you can to make sure the other person understands you.
4. Be sure to say something when you don't understand the other person.
5. Carefully listen to one another; try to understand the other person's point of view.
6. Try to find things you can agree about.
7. If you disagree about something, do so respectfully, and try to understand the other member's point of view.
8. Both of you should participate in any decisions made today.
9. Both of you have joint responsibility for any decisions made today.
10. Your responsibilities as good team members do not end today. You both have to continue to follow the plan of care you agreed upon today. [95]"

Many of the above suggestions could be directly incorporated into the existing waiver education session that activist parents are required to attend at their LHD prior to filing NMEs. Others could be adapted to meet the more specific contextual requirements of school-entry immunization education. For example, Suggestion 10 could be modified to read: "Your responsibilities as a good team member do not end today. You both have to continue engaging with evidence-based approaches to school-aged immunization education."

Based on focus group interviews of 39 Michigan waiver educators, Navin et al. report a trend among these frontline educators, largely undertaken as a result of their own initiative, of

shifting their initial approach from attempting to "correct" or falsify the beliefs of activist parents during the health encounter to an approach with the objective of establishing rapport and trust with activist parents in the initial public health encounter that can be positively leveraged in future encounters [15]. In addition, many waiver educators seek to minimize confrontation with activist parents during the health encounter, with one waiver educator explicitly articulating an approach to waiver education that is arguably consistent with addressing the social identity-related needs of activist parents [15].

> "'Listen, you're a mom, I'm a mom. There are so many uncertainties as a parent, you are making the best decision you know how' …….So I've just changed and I really have a soft approach, and 'we are all in the same boat, and we're here to help you and answer any questions' and try to get that in that 'we are your friends not your enemies… [15, p. 1754].'"

That is, efforts to reduce the defensive reactions associated with social identity threat and efforts to induce potential superordinate identities such as "moms" and "we are all in the same boat" as a strategy to increase intergroup harmony (bias reduction and trust enhancement) between public health professional subgroups and activist parent subgroups are consistent with a social identity-grounded approach to waiver education, and could be refined as part of a more intentional and systematic health encounter-delivered intervention. However, Navin et al. also report that some waiver educators in well intended efforts to customize their approaches to meet the diverse needs of exempting parents still elect to discuss risks associated with vaccine-preventable diseases [15], which potentially can (inadvertently) provoke social identity threat in exempting parents with strong subgroup-based affiliation to a low-benefit, high-risk vaccination-related prototype. Given the current variation that exists in the approaches utilized by exemption educators in Michigan, and the relative paucity of

continuing training these educators receive in managing the health encounter with activist parents [15], a more evidence-based and systematic approach is needed that intentionally and consistently addresses the social identity needs of activist parents.

A new social identity-based intervention intended to complement or replace the waiver education session currently required for activist parents in Michigan ideally will be designed by a research team that includes a social psychologist. Preliminary evidence from this study suggesting that female activist and female fully vaccinating parents, compared to their male counterparts, excel in promoting non vaccination-related healthy behaviors in their children (healthy eating and physical activity), and in establishing healthy family environments that support non vaccination-related dimensions of their children's health (e.g., obesity control), potentially can be utilized as a basis for establishing a new common superordinate identity that simultaneously acknowledges the vital subgroup identities of female activist parents to bridge the current division between female activist parents and conventional medical/health authorities. That is, this new common superordinate identity can be induced between female activist parents and public health professionals based on the mutual commitment of "playing on the same team," while at the same time public health professionals can introduce a new messaging strategy that directly affirms the gender-based social identity and indirectly affirms the health activist-based social identity of female activist parents. A parallel effort can be made to induce a common superordinate identity between male activist parents and public health professionals, but this study does not generate evidence that can be utilized to create a new health messaging strategy to simultaneously affirm the unique subgroup identity of male activist parents. Exact formulation of this new intervention ideally should be well-grounded in

social identity and social categorization theory and be informed by focus-group discussions with activist parents. In addition, this new intervention will need to be carefully pilot-tested in a randomized control trial to ensure that it does not induce a common superordinate identity susceptible to bias generating and trust diminishing intergroup processes (i.e., ingroup projection). A successfully piloted intervention ideally should be delivered to activist parents scoring highest on a pre-screening assessment measuring distrust levels of conventional medical/health authorities (the proposed assessment in this study could be modified to better align with the trust literature). If successful in this context of improving intergroup perceptions between activist parents and conventional medical/health authorities, the approach could be extended to include vaccine manufacturers, perhaps in a community organized forum bringing together representatives of activist parents and vaccine manufacturers to complete a common superordinate identity exercise. In addition, consideration should be given to continuing the delivery of the educational session in its current form to activist parents who exhibit relatively low distrust of conventional medical/health authorities or vaccines themselves (compared to other activist parents) in pre-screening, as these parents are potentially likely to exhibit greater receptivity to health messaging focused on vaccination-related benefits. And finally, consideration should be given to assessing distrust levels in all fully vaccinating parents and to delivering the educational session in its current form only to the fully vaccinating parents exhibiting relatively low trust levels (compared to other fully vaccinating parents) in conventional medical/health authorities or vaccines themselves, as these parents may be at elevated risk of delaying and/or refusing vaccination sometime in the future for their school-aged children, but remain for the time-being relatively unaffiliated with a strong vaccination-

related social identity and therefore (likely) more receptive to the nudge provided by positive vaccination-related health messaging.

Strengths and Limitations

Major limitations of this study already discussed include: 1. Unreliable or imprecise assessment of the healthism, social identity, and trust constructs, and 2. Utilization of convenience sampling that likely compromises the study sample's representativeness of the target population. An additional major limitation of this study is its small sample size; the results, therefore, should be viewed as provisional until the trends observed in this exploratory study can be subjected to replication in a larger study. Other study limitations include:

- Possible set (survey) response bias, and
- Possible information bias introduced through parent self-report of children's general health status and health outcomes.

Moreover, due to the cross-sectional design of this study, no causal inferences can be made (all associations observed in this study should only be considered correlational at this point), and the direction of associations in this study could be reversed, as time-order cannot be determined. Finally, the observed significant associations may be confounded by other unassessed variables (e.g., private school attendance).

Strengths include:

- Research approach and interpretation informed by informal conversations with frontline and administrative staff at LHDs delivering vaccination and waiver education services;

- Seemingly 1st study jointly assessing role of healthism, trust, and social identity-related concerns on vaccination-related decision-making in parents responsible for vaccination status of their school-aged children;
- Seemingly 1st study offering enhanced theoretical framework explaining differential parent responses to vaccination-related convenience-based nudges and education-based social identity threats;
- Seemingly 1st study jointly assessing sensitivity of fully vaccinating and activist parents to social identity-related concerns that can prop up or buffer against unfalsifiable convictions;
- Focus on bypassing healthism in favor of addressing social identity to increase trust between parents responsible for the vaccination status of their school-aged children and conventional medical/health authorities creates new targets for intervention and opens the door to new sociopsychological-based interventions aimed at reducing NME rates in Michigan;
- Preliminary evidence that screening can be utilized to improve categorization of parents responsible for the vaccination status of their school-aged children (refinement and implementation of screening could help to identify which parents would benefit from conventional education and which parents would benefit instead from a new sociopsychological-based approach); and
- Preliminary evidence suggesting that consideration should be given to extending existing vaccination-related education to fully vaccinating parents who exhibit relatively low trust levels in conventional health authorities and/or vaccines in prescreening when utilizing vaccination services at local health departments in Michigan.

Conclusion: A Modest Start

It may be tempting to believe that generating new knowledge about the efficacy and safety of vaccines required for school-entry will bridge the current divide separating activist parents and conscientious public health officials. But the question must be asked: Is this type of knowledge generation aligned with the decision-making architecture of activist parents based on their healthism, trust, and social identity-related needs? This study seeks to demonstrate a complementary approach that is more aligned with this architecture, but it is possible that inducing a common ingroup identity based on following a team concept may not be the most optimal way to accomplish this important objective. In addition, there may be a better approach than utilizing FNPA Survey Data to indirectly affirm the unique subgroup identity of female (and potentially male) activist parents. The modest aspiration here is that this study in spite of its limitations in conceptualization and execution opens a door to a new line of interdisciplinary inquiry.

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