INOCULATION THEORY AND IMMUNIZATION PROMOTION

by

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(Under the Direction of Mark G. Wilson)

ABSTRACT

The purpose of the study, Inoculation Theory and Immunization Promotion, was to find out if health promotion materials, in this case a poster promoting childhood immunization, would work better if based in theory than if derived through creativity alone. Inoculation Theory was chosen to support the intervention, and three messages were tested, taken from the immunization literature of the most common reasons parents provide to avoid or delay their child’s vaccinations.

Six hundred and eighty participants answered questions about attitudes toward childhood immunization at a medical clinic in Georgia. Demographic information was collected, and questions on vaccination were measured using a 5-point, Likert scale. During the period of the study the media was monitored on local and national levels to ascertain if an influential story on immunization occurred. Immunization was universally viewed as an important issue, and posters on the subject were highly memorable. One of the three messages, on the unexpectedly large number of shots required in the primary immunization series, was found to be significantly different and memorable from the control. Although almost all persons trusted their doctor’s shot recommendations, a quarter indicated that too many shots could weaken or overwhelm an infant’s immune system, and half of respondents indicated worries about vaccine safety.

Lack of trust of doctor, misunderstanding of the small risks of immunization, and lack of understanding of the benefits of immunization were expressed particularly by some African-American respondents, posing an education opportunity to service an evident need. Children with minor illnesses are almost always eligible to receive vaccines, yet equal numbers of women expressed agreement, uncertainty and disbelief at this, presenting another education opportunity. Future research should focus on supporting the patient/doctor interaction with ethnic and age tailored, theory-based, pro-immunization materials.

INDEX WORDS: Inoculation Theory, Immunization, Attitudes, Recall, Health Communications, Health Education, Health Promotion, Social Marketing, Vaccines, Vaccination
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A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial
Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2003
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ACKNOWLEDGEMENTS

There are many institutions and persons to thank, who have offered me support during this quest for a doctoral degree. The Centers for Disease Control and Prevention (CDC) National Immunization Program sponsored my coursework and the National Center for HIV, STD, and TB Prevention granted time to complete this dissertation. Walter A. Orenstein, Roger Bernier, Vicki Freimuth, and Melissa Shepherd offered support and encouragement at key moments at CDC. Special thanks are owed to Jennifer Smart and the doctors, nurses and clients of Children’s Medicine, P.C., without whom I could never have gained such interesting experience in conducting first-person social behavioral research. In education, Mel Kahn and George Platt at Wichita State University turned my Bachelor of Arts degree into a beginning rather than a culmination. Bill Waugh at Georgia State University reminded me that graduates with a Masters of Public Administration require a good sense of humor. Roxanne Parrott offered me opportunities and connections at The University of Georgia and beyond unstintingly and enthusiastically, and to her I am particularly indebted. Mark Wilson and Stu Fors acted as advisors and shepherds of the many processes I have worked within, and Glen Nowak, Laura McCormick, Dean Krugman, Elli Lester, Kenzie Cameron, and Seock-Ho Kim encouraged me to take theory beyond the classroom and committee meetings into health communications practice. Thanks to my sister Susan for stuffing all of those envelopes with me! Finally, and most importantly, I wish to express my deepest appreciation to my wife, Monica, and children, Connor, Chloe and Alexa, for indulging me the time to work
on this project, and for taking me away from it at times. I am pleased to dedicate this
dissertation to my entire family with love.
# TABLE OF CONTENTS

| ACKNOWLEDGEMENTS | iv |
| LIST OF TABLES | ix |

## CHAPTER

1. **INTRODUCTION** .................................................................1
   - Overview .............................................................................1
   - Immunization in America ................................................3
   - Research Question .........................................................11
   - Definitions ........................................................................12

2. **REVIEW OF THE LITERATURE** .........................................14
   - The Case for Inoculation Theory ......................................14
   - Ethical and Policy Implications of Inoculation Theory Usage .28
   - Media Roles in Childhood Immunization ..........................32
   - Incorporating Behavioral Theory into the CDC Health
   Communication Paradigm ................................................34

3. **METHODS** ........................................................................38
   - Research Question .........................................................38
   - Subject Selection and Setting ..........................................38
   - Intervention Description ...............................................40
   - Research Design ............................................................41
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>POSTER 1 (EXPERIMENTAL POSTER)</td>
<td>106</td>
</tr>
<tr>
<td>H</td>
<td>POSTER 2 (CONTROL POSTER)</td>
<td>108</td>
</tr>
<tr>
<td>I</td>
<td>PRETEST</td>
<td>110</td>
</tr>
<tr>
<td>J</td>
<td>POSTTEST</td>
<td>113</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1: Manipulation Check – Respondent Ethnicity ......................................................54
Table 2: Study Respondent Ethnicity and US Census Comparison ..................................56
Table 3: Study Respondent Religion and Georgia Comparison ........................................58
Table 4: Mean Differences for Three Primary Messages ..................................................59
Table 5: Analysis of Variance for Recall of Immunization Messages ..............................60
Table 6: Pearson Correlations Between Key Message Components ...............................63
Table 7: Crosstabulation Between Ethnicity and Benefit of Immunization ......................63
Table 8: Crosstabulation Between Ethnicity and Trust of Doctor .....................................64
Table 9: Crosstabulation Between Ethnicity and Understanding of Immunization Risks ..........................................................................................................................65
Table 10: Pearson Correlations Between Parent Age and Anxiety Measures ....................67
Table 11: Comparison of Study Phrase Items and Study Measures ...............................73
CHAPTER 1
INTRODUCTION
Overview

Childhood immunization is listed as the greatest public health achievement of the twentieth century, by the Centers for Disease Control and Prevention (CDC) *Morbidity and Mortality Weekly Report (MMWR)* (CDC, 1999a). At face value, immunization is a civic duty that confers personal and societal protection against known diseases. An ounce of prevention is worth a pound of cure, as the saying goes, and immunization is widely accepted as a low-risk way to confer safety from microbial threats that only a few generations ago regularly sickened, crippled, or killed children and adults by the hundreds of thousands (Humiston & Good, 2000). Risk to the child of unintended effects of vaccination is exceptionally low for a medical intervention, yet not zero (CDC, 1994a). Although typically worrisome to parents, this low risk is not viewed as sufficient to forego the needle, especially when epidemics of childhood diseases were once so commonplace (McCormick, Bartholomew, Lewis, Brown, & Hanson, 1997).

Advances in biotechnology have facilitated the prevention of many diseases through vaccination, and accordingly a schedule of shots developed (Journal of the American Medical Association, 1993). Shots are given in the early years of life to replace the waning immunity passed from the mother to child after birth, or to confer immunity to the child from diseases the mother may never have encountered. Most vaccines work on the principle of stimulating natural responses in the body to fight a weakened agent
(antigen), and, in doing so “train” the immune system to recognize and defeat actual diseases if exposed later in life (Atkinson, Humiston, Wolfe, & Nelson, 1999). Some vaccines confer lifelong immunity; others wear off and require boosters. Most vaccines require administration through use of a needle, to bypass strong stomach acids that might destroy the immunity-stimulating antigens from doing their job if consumed naturally (Atkinson et al., 1999). Oral polio vaccine (OPV) was an exception to this procedure, but because a few children actually got polio from the oral vaccine each year, policy makers changed the recommendation around it, replacing OPV with the injected type of the polio vaccine in the last years of the twentieth century (CDC, 2000). In this same time, other older and less efficacious vaccines also came under increased scrutiny as disease levels receded and vaccine safety issues became more sensationalized (Chen & Hibbs, 1998). In the absence of natural disease, epidemics are composed of smaller and smaller numbers of cases, and coupled with more sensitive diagnostic techniques, reveal the shortcomings of vaccines that were less explored in the era of actual disease prevalence. Advocacy groups, such as the National Vaccine Information Center (NVIC), formed and began to exert influence in opposition to mandatory vaccination regimens, or against particular vaccines, using television and the Internet to communicate their messages. Examples are available at the website http://www.909shot.com (accessed March 8, 2003). Imputed causal relationships between vaccine receipt and triggering of autoimmune diseases began to be debated, for example, in purported linkage between autism and Measles/Mumps/Rubella vaccine (Taylor, Miller, & Farrington, 1999). Print and televised media have amplified the voice of these small groups of non or anti-vaccinators to speak to the general population easily, and to exert personal, legislative, and social
influence at a level similar to public health efforts to promote vaccination (Institute of Medicine, 1996a). Anti-vaccination advocates express mistrust of government programs, mandatory practices, and outrage over tragic consequences to the few, imposed by the rules for the many.

Public health goals add a dimension of urgency to this forum. Over a dozen vaccine-preventable diseases are at historic low levels, as a direct consequence of efforts to eliminate them (CDC, 1999b). Three, pertussis (whooping cough), measles, and polio stand at the brink of eradication, which means once gone, always gone. Precedent for removal of a microbial threat was established in 1977 when the very first disease deliberately eliminated through the efforts of medical science, smallpox, was certified “eradicated” by the World Health Organization (Etheridge, 1992). If vaccination programs were to stop or to be substantially hindered in their missions at this critical juncture, their success could be undone in a generation, virtually insuring the return of many diseases.

If immunization promotion (already supported by society) could be further bolstered by a firm theoretical framework for initiation and maintenance, then perhaps some of the hubbub around childhood immunization could be reduced. Public and personal health would benefit from high immunization rates, but the genuine value of a theory-supported intervention would be in informed medical decision making for parents and consistent, complete, and uneventful immunization for infants.

Immunization in America

Immunization is one the most successful health interventions known (CDC, 1994b). Today, vaccine preventable diseases (VPDs) are dwindling, but the need for
vaccines and consistent vaccination practices remains high. Eighty percent of U.S. two-year olds were fully immunized in 1998 (CDC, 1999b), leaving approximately 800,000 of the four million American children born each year (Public Health Service, 2000) behind on their shots, in spite of widespread availability of vaccines, uniform codes for administration and legal mandates requiring immunizations for school and/or daycare entry (CDC, 1994c). Many factors account for low “on time” vaccination rates: missed opportunities by health care providers to vaccinate (CDC, 1994b), systemic barriers such as inconvenient clinic hours (Bates, Fitzgerald, Dittus, & Wolinsky, 1994), or resistance to vaccination due to potential side effects (Lannon, Brack, Stuart, Caplow, McNeill, Bordley, & Margolis, 1995). And, a child who starts the vaccination series late is less likely to complete it at all, compared to a child who starts on time (Bates et al., 1994). Important too are parental anxieties brought along with the child to the doctor’s office—with answers, information, and assurance needed before immunization can take place.

The routine definition for being up-to-date or on time with childhood vaccines is described by CDC as a child having received the first 15 vaccine combinations by age two, in adherence to the immunization schedule (CDC, 2002). The schedule calls for well-child visits for immunization purposes at birth, 2, 4, 6, 12, 18, and 24 months of age (See Appendix F). Immunization is now recommended for measles, mumps, rubella (German measles), polio, tetanus, pertussis (whooping cough), diphtheria, varicella (chickenpox), hepatitis B and *Haemophilus influenzae*, type B (source of spinal meningitis, not “the flu”). Although several vaccines are administered at intervals after the primary series, including ages 5, 12, and decennially for tetanus boosters, the primary series is considered the most important and is designed to be completed by age two.
Childhood diseases claimed hundreds of lives annually before vaccines were available, and sickened tens of thousands (Plotkin & Orenstein, 1999). Avoiding the burdens of morbidity and mortality through use of vaccines is considered a triumph of public health, but as personal experience with VPDs are becoming rarer (CDC, 1994b), so are the memories of dread effects of those diseases acquired naturally, that is, from person to person, as opposed to disease acquired through lab accidents or vaccine failure. Newer vaccines for varicella, hepatitis B, and Haemophilus influenzae type B have become available but some of the diseases prevented, notably chickenpox, are considered increasingly mild. There is no guarantee that the phalanx of biologic threats will continue to retreat from the headlines into the history books, however. In 1993, over 5,000 persons were recorded with pertussis in the U.S. (CDC, 1993), and although mass vaccination against pertussis was stopped in the 1980s due to public outcry over side effects in Britain and Japan, pertussis resurged, leading these governments to once again endorse national vaccination for this antigen (Gangarosa, Galazka, Wolfe, Chen, Phillips, Gangarosa, & Miller, 1997). Smallpox, the first vaccine preventable disease eradicated by medical science required global mobilization to be completely stopped (Etheridge, 1992). Although recently in the news as a potential bioterror weapon, there is not currently a U.S. policy in place to mandate a return to population-wide vaccination against smallpox.

Laws in all 50 states mandate that information about the benefits and side effects of vaccines be distributed to all individuals before shots are given (CDC, 1994c). But, advocates and opponents of immunization present contradictory information about the risks and benefits of immunization. On the government side, CDC developed three waves
of a pro immunization health communications campaign in the 1990s using the following themes:

- “At Least Twelve Shots by Two. How Sure Are You?”
- “Even if You're Sure, Ask Again.”

These campaign themes were based upon consumer qualitative research and Madison Avenue expertise for saliency, appeal, and a call to action that resonated well with experienced and novice parents, especially targeting communities that had below average immunization rates. Although starting with a positive appeal, it was determined that movement to a fear appeal based strategy might prove more effective in motivating parents to immunize (Witte, 1992). This movement was driven by focus group findings, not by study of persuasion theory. The focus was on the number of shots being more than a parent expected, and use of this “news hook” to raise concern, and ultimately action to immunize. The three waves were developed at a cost of two million dollars apiece, but did not use an established health communications theory to predict or describe how they would work. A separate campaign targeting Hispanic and Latina audiences was developed and deployed using the tagline “Esperar Es Lamentar” (you wait, you lose, or to wait is to grieve) during the same time period. Again, consumer pretesting was conducted, but the campaign was not designed using a theoretical basis for the intervention. Television, radio, poster, billboard, and transit materials were released in English and Spanish. Evaluation measures for both campaigns were process-related; number of placements, their location, duration of run, and media used were tallied. Outcome measures related to immunization rates in the cities where ads ran were
examined, but no causal relationship was suggested. The CDC commitment to communicate the value of infant immunization in the mid 1990s was supplemented by state and local immunization programs and not-for profit organizations such as Every Child By Two, Kiwanis, and Rotary International who also conducted social marketing campaigns promoting vaccination.

The Institute of Medicine (IOM) reported that organizations that oppose mass vaccination garner media time at local and national levels (IOM, 1996b). The National Vaccine Information Center and others routinely challenge public health recommendations of mass vaccination practice, importance, basis, and relevance. Many of the appeals of these organizations are rooted in anecdotal stories of children allegedly damaged or killed by vaccines. Themes used to influence parents in the 1990s included:

- “When it happens to you or your child, the risks are 100%.”
- “Government says Maggie, not the vaccine was to blame.”

These themes were used in pamphlets and newsletters to assert that even if the odds of an adverse event were one in a million, that if you are that one, your risk is inescapable, and that the Government would always blame other factors on your child’s adverse event, rather than receipt of a vaccine (as implied by the “Maggie” theme).

Research into the effects of vaccine horror stories that have attracted media attention is scant, yet according to McCormick et al. (1997) parents report that they talk about them with one another and their respective pediatricians. Television, newspaper, radio and the Internet are used to deliver both positive and negative images, messages and stories; thus parents may hear different “experts” opine about the safety and efficacy of vaccination, increasing their anxiety and uncertainty about who is right and what to
believe. The profusion of Internet-related information on health issues in particular puts credible and non-credible sources side by side, further muddying the information waters for technologically inclined information seekers. “In cyberspace, all voices are accorded equal weight, and in fact, the very ‘subversive’ nature of the Internet may even diminish the ‘source credibility’ of these usually authoritative voices,” according to Jowett and O’Donnell (1999, p. 159).

The effects of “the media” on human behavior, particularly as it relates to initiation, maintenance, and change of action have been extensively studied (Klapper, 1963; Czitrom, 1982; Rubin, 1984; Downing, Mohammadi & Sreberny-Mohammadi, 1995). Communication theories abound to explain and predict the effects of messages designed to sell goods, diffuse ideas, and adopt behaviors (Rogers, 1976; Anderson, 1983; Muehling, Laczniak, & Andrews, 1993). Government campaigns using the media against smoking, drunk driving, starting forest fires, or to promote immunization take place at the societal level of transmission. Interpersonal efforts accompany and amplify the larger message, when nurses answer personal questions in clinics, or hotlines and websites provide impersonal, yet specific information designed to sustain credibility of public health programs and to respond to issues from consumers. For example, CDC has an extensive website, conducts many health campaigns annually, employs hotlines to respond to consumer input and needs, and uses the popular media to encourage vaccination.

Communications that support vaccination must explain what the diseases are, what their effects can be, and indicate that prevention is likely through vaccination (Prislin, Dyer, Blakely, & Johnson, 1998). Yet to do so in the absence of a theoretical
framework leaves little basis for prediction of effects, anticipation of challenges, or systematic description of mechanism of message uptake, salience or response to the call to action.

Due to their comparative rarity, VPDs are removed from general experience, so warnings to avoid them become preparation for an abstract threat, rather than a familiar or even known menace. In immunization, a weakened form of a biological agent is introduced into the body to stimulate the immune system to learn how to repel the infection. The immune system is thus primed to do so again, if ever faced with a more powerful version of the attenuated organism. Inoculation Theory is the psycho-educational analogue to this biologic process, and it suggests that if one were prepared to offer weak counter arguments of some kind before hearing attacks on a given topic, one would stand a better chance of withstanding those attacks, when they actually happen (McGuire, 1966). Stated another way, if a person is given information that explains how to answer questions or arguments on a topic in advance of hearing them, the persons will use that information to respond, when the opportunity occurs. Derived principally through the work of W.J. McGuire, Inoculation Theory has been used in communication interventions from the late 1950s to the present day, on topics ranging from political campaign “attack ads” (Pfau & Burgoon, 1988) to smoking prevention (Pfau, Van Bockern, & Kang, 1992). It was also used by Standard Oil Company to protect market share from price erosion and federal regulation (Hunt, 1973). Preparation of preemptive refutations to common arguments against vaccination may favorably position a parent to field questions from peers or to parry media stories that attack vaccination. Inoculation
Theory-derived messages could support the practice of immunization and offer reasons to reject arguments against it.

Messages about health effects of immunization appeal to the heart and the mind. Appeals can take on emotional affective tones, or they can be cognitive and data driven in nature. To convince parents of their points of view, both pro and anti-vaccination advocates use statistics and images. Themes that encourage parental responsibility to vaccinate, or that introduce new vaccines to the familiar schedule may be educational, but are not perceived as motivational according to Prislin et al. (1998), a shortcoming of the three CDC campaign messages mentioned previously. Suggested dangers to children’s health from vaccination may increase parental uncertainty, but lack governmental credibility, as in the prior identified NVIC messages. Parents respond to both the affective approach of those who attack childhood vaccination with horror stories as well as the cognitive approach utilized by the medical establishment that recommends vaccination. One leverages credibility, the other utilizes empathy, but neither approach uses theory to predict, define or drive the messages presented. To be fair, both CDC and the NVIC are not the sole players in the vaccination universe, and do not rely exclusively upon science or emotions to communicate. But principally, CDC communicates about immunization in a systematic, cognitive manner, and NVIC uses moral outrage to draw attention to itself. Both tactics seem to work to a limited extent, but if a credible entity merged emotional and cognitive appeal domains and used a theoretical basis for communications, that group may be able to exert lasting, sustainable and predictable influence upon parental immunization decision-making.
Research Question

Witte (1996) posed the question, “Does using empirically grounded theory in message development work better than creative inspiration and common sense alone?” in her lament about the gulf between academic research and field practice. Addressing this philosophical concern formed the basis for the study, and motivated the researcher to compare an existing CDC poster “Immunize On Time. Your Baby's Counting On You.” with the proposed Inoculation Theory derived “Baby Shot Time?” poster described in the Methods section. Based upon the literature, the researcher asked the following Research Question: **Is a childhood immunization poster, located in a medical clinic and based upon Inoculation Theory more likely to change parental attitudes toward immunization, than a creative, but non-theoretically derived poster in the same setting?**

The principle Hypothesis tested was that: **Parental attitudes toward and recall of immunization messages about a child’s pain, number of shots, or ability of the child to receive shots while ill will be stronger after passive exposure to an Inoculation Theory based message than those stimulated by passive exposure to a creative, but non-theoretically derived message.**

Prislin et al. (1998) listed the most common complaints that parents give as pretext for avoiding vaccination, and Inoculation Theory suggests that head-on refutation of arguments is the best way to confer psychological immunization against them. The Inoculation Theory-based poster (Baby Shot Time?) contains preemptive refutational responses to three of the most common reasons parents give to avoid immunization: pain of the moment, large number of vaccines a child receives, and medically unwarranted
refusal to vaccinate during a sick visit. An example of this last situation might be where a
parent brings in a child with a slight fever from a bee sting, but does not want to give a
child a needed shot due to fear that the immune system might be overwhelmed. There are
few valid contraindications to vaccination from fever or malaise, but a parent may
nonetheless refuse an offered shot (CDC, 2002). A comparison of attitudes on these
issues before and after exposure to the poster tested the principle hypothesis.

Definitions

**Attitudes** – A person’s subjective valuation, in a positive or negative direction, toward
the subject at hand, commonly measured as a dependent continuous variable from 1
(Strongly Disagree), through 3 (Unsure), to 5 (Strongly Agree).

**Contraindication** – a medically valid reason not to give a child a shot.

**Creative, non-theoretically derived** - Poster content driven by consumer qualitative
input (focus groups), without use of theory.

**Health communications** – A blend of social and interpersonal communications to
persuade, train, or inform persons about health topics (Kreps & Thornton, 1992)

**Health education** – Transformative process to encourage individuals to adopt and
eventually model healthy living choices (Downie, 1990)

**Health promotion** – The process of encouraging adoption of healthy behaviors
conducted on a social scale (Glanz, Lewis, & Rimer, 1997)

**Herd immunity** – The public health principle where if 90 percent of a population is
vaccinated, the remaining 10 percent are protected from diseases without vaccination.

**Immunization** – The successful conclusion of a vaccination, lasting immunity to disease.

**Immunization messages** - Pro immunization statements.
**Inoculation** – A theory under proposal that confers psychological immunity to arguments that oppose immunization. In the context of this study, the term is not interchangeable with immunization, vaccination, or shot.

**Inoculation Theory-based** - Poster content suggested through application of key principles of Inoculation Theory.

**Passive exposure** - Placement of poster in the environment of the human participants where no particular attention is drawn to it.

**Preemptive refutation** – A response to a challenge made before the attack occurs, with the purpose of canceling out or greatly reducing its impact once made. [Also called forewarning.]

**Refutation** – A response to a challenge, sometimes referred to as a counter attack.

**Social marketing** – the art and science of promoting planned, target social change (Kotler & Roberto, 1989)

**Vaccination** – The process of conferral of biological immunity to a disease through use of a vaccine.

**Vaccine** – Preparation given orally or by injection designed to reduce human morbidity and/or mortality from an infectious microorganism.
CHAPTER 2

REVIEW OF THE LITERATURE

The Case for Inoculation Theory

History, philosophy, religion, math, science, and the arts are taught in institutions where the scholar’s traditions have evolved around transmitting the knowledge of the past, encouraging the debate of the present, and forming the foundation for the fads, trends, and scholarly inquiry of the future. Ideas are originated, debated, diffused, and updated. Advocates for particular ideas use techniques to influence others, using whatever medium is best suited to the audience reception. Social scientists began to specifically examine the influence of the media upon attitudes early in this century, through use of scales to correlate personal attributes with reasons for actions taken (Czitrom, 1982). In the 1940s, pollsters described attitudes and behaviors of populations with simple statistical procedures, but by the 1950s, refined techniques were employed to infer or predict behavior as well (McGuire, 1985). Festinger (1957) developed a scheme of cascading hypotheses to describe the ways persons evaluate their world based upon their own faculties, used in concert or separate from others. Eventually termed cognitive dissonance, for the capacity of the human mind to simultaneously entertain conflicting notions, Festinger sought to explain how social comparison processes pressure conformity or allow individualism in decision-making. Festinger described and predicted behavior along axes of attitudes generated by the self and of those copied from others.
Naturally, broad study of the influence of the media upon behaviors led to more specific inquiry into the ways to generate specific behaviors, such as predilection to use certain commercial products, using the media (Klapper, 1963). McGuire (1961a) pursued Festinger’s ideas by testing “cultural truisms;” ideas that are held so strongly that they would almost be invulnerable to attack. Social conformity could be expected with items such as “Persons should get routine medical examinations.” The health area was identified early on by McGuire for it’s utility in fostering strongly held beliefs, presumably invulnerable to attack (McGuire & Papageorgis, 1961). The nuance that McGuire chose to explore in his earliest work was the difference between support and attack in maintenance or eschewment of the prior held belief. He chose topics with universally high levels of acceptance, to best assess the vulnerability of attitudes. His results are the reported mean differences between conditions. He observed that a direct refutation worked better than a supportive argument, but that neither effect could be extrapolated very far, since the student’s new opinions were not followed after the two-day period of the study. In other words, he produced a psychological immunization, but did not study how long the attitude would be maintained. McGuire did acknowledge this limitation in his early work. He also mentioned that source credibility played a role in the acceptance of the materials presented in the experiment.

The follow-up study suggested that immunity could be stimulated through refutations not directly aimed at arguments made. Counter argument immunity may be generally induced from an inoculation, that need not be issue-specific or related point-by-point to the attack (ibid). These results widened the field, suggesting that refutations made to as yet unheard arguments confer statistically significant levels of immunity to
these arguments as well as others like them. McGuire then studied the level of participation intensity by the subjects (McGuire, 1961b), and observed that passive readers of materials form stronger opinions than persons who must actively process the new information, through summarizing or highlighting the materials read, somewhat contrary to expectation. McGuire’s hypotheses were again consistent with the data; general immunity was induced as well as or better through passive rather than active refutation of arguments, and novel arguments were refutable from close, but different original material.

McGuire then studied temporal length of conferred immunity (McGuire, 1961c), varying his experimental conditions to immediate, two day and seven days between inoculation and attack. He experimentally confirmed the “sleeper effect;” a condition of forgotten readiness in which a subject is ready to defend himself with arguments not immediately recalled, but capable of resurrection and use after a threat. This result suggests that a good attitudinal inoculation remains effective long after the inoculation was rendered, although extreme length between inoculation and attack was not explored in this study. He also defined the “paper tiger” effect, where persons who received supportive arguments to beliefs already held, increased their belief level. This false sense of security makes such a person extremely vulnerable to attack, as they are completely unready to cope with a new view that challenges their belief, as a result of the increased support in their already established beliefs.

Manis and Blake (1963) tested student interpretations of messages compared to the actual messages. Students worked to interpret given messages as a means of preserving initial beliefs in the face of opposition. Importantly, sources of messages were
highly credible physicians, to covary out the effects of perceived credibility in the attack message. Although students’ interpretations of the material did differ somewhat from what was actually said, the central finding was of the importance of a small time gap between attack and refutation; it proved significant to bolstering response skills.

Forewarning (another term for preemptive refutation) was demonstrated more effective when rendered before, rather than after an attack (Kiesler & Kiesler, 1964). This study suggested that if a person is forewarned that they are about to be exposed to propaganda, they will be far more likely to reject the subsequent information than if they are attacked on a subject first, and are then told that the attacks are spurious. First one to punch, wins, in effect. McGuire picked up on this development and within a year had tested it under several conditions (McGuire & Millman, 1965). They found that a person begins changing an opinion immediately after exposure to forewarning, initially more so from an emotional appeal than from a technical one, but in the end, a technical issue results in more substantial change of opinion than that brought on by emotion.

Credibility, once capitulated to a spurious source, may also be hard to regain, as persons seek to rationalize their prior decision in the face of a more credible source. So, in the example of this study, a person may be swayed by an antivaccinator speech, but when it comes time to immunize, may do so—even if regretfully—to sustain a prior understanding or opinion toward vaccination. These opposing theories, and predicted actions, in the face of forewarning, inoculation, and attack, make a person into a kind of ideological ratchet, clicking between contrary actions, depending on recency of exposure to information and level of prior belief (Freedman & Sears, 1965).
Festinger weighed in with another variation to the inoculation/attack/evaluate series, introducing the construct of distraction to the equation (Festinger & Maccoby, 1964). He showed that distraction during the inoculation is effective in preventing strong counterattacks. Message uptake was greater when the person had to attend harder to make out the meaning, which seems a reasonable conclusion to an alternate hypothesis, that persons forced to attend to a message are more likely to be influenced by it.

Stone (1969) showed that recipient gender was unimportant to persuasion—a variable unexplored by McGuire, and that credibility of source is of great importance—an early conclusion in McGuire’s first work. Self-esteem, shown to be of promise in this singular study, came and went without further exploration until the 1990s. The importance of source credibility was again noted by also Bither, Dolich, and Nell (1971).

The early era of Inoculation Theory was best summarized by its founder, McGuire, in a popular account from 1970, in Psychology Today. This summary is the closest that the founder of Inoculation Theory came to enunciating constructs formally:

- Inoculation treatments work best when the attitude of interest is strongly rooted in personal belief,
- Arguments are retained better through passive exposure than when active participation is required to defend or assert counterarguments,
- Refutation of potential arguments is better defense than making supportive statements about the attitude,
- Some time lag assists formation of responses between inoculation and attack, since forewarning serves to motivate the listener to prepare defenses,
• Persistence of the resistance declines over time, and

• Health topics are an ideal context in which to apply Inoculation Theory.

Of these, the second, on passive retention, seems the most counter intuitive. McGuire elaborates that one is only able to marshal a relatively poor arsenal of incomplete arguments when actively defending information immediately after exposure, but if one has only to think about counter arguments without actively applying them, they can then set in memory, for later action (McGuire, 1964). This observation is further elucidated in point four on the benefit of time lag assisting in preparation for defense.

One of the principle problems with operationalizing Inoculation Theory is that researchers in the post-McGuire era have tested more and more specific tenets of these constructs without empirically validating them as discrete operands. Unlike the Health Belief Model, Social Cognitive Theory or other predictive theories of behavior, these constructs are not principles with validated subscales or places on a continuum of belief or action. They are more like “best practices,” or “important considerations,” making them difficult to measure. A Likert-type scale is used by McGuire and subsequent Inoculation Theory adherents, but correlation between actual attitudes and beliefs and strength of commitment to the idea or counter idea has not evolved into a commonly accepted scale or measure.

Burgoon, Miller, Cohen, & Montgomery (1978), improved the methods of Inoculation Theory testing. Passages to be read were screened by faculty experts and were approximately the same length and language intensity. Nine experimental conditions were constructed in a counterbalanced design (N=230). Manipulation checks were performed to assess levels of threat and intensity, and reliability analysis was
conducted. The conclusions were complex: after persons were asked to evaluate the first message, they became more negative toward the experimental topic upon review of the second message, regardless of message valence. Telling people to pay attention to the message and source may play only into their strengths, thus leaving them vulnerable to attack the second time around. This result suggests boundedness in credibility issues as well. Playing the credibility card can work in the short term, but may leave persons with a false sense of personal sufficiency, when they may still be persuadable.

If credibility must be carefully played, then would strength of the argument, when coupled with a credible source, work even better? What about an extremely strong argument? Sawyer (1973) noted possible problems with the psychological construct of reactance to strongly worded counterarguments, as applied to an attitudinal inoculation. Reactance is the response to a message that is too threatening, where a person simply ignores the dangers presented to avoid having to consider the dire consequences presented personally (Roskos-Ewoldson, 1997). If a threatening appeal contains information that is designed to cause action, but is too scary, consequential, or direct, the exact opposite of the intended effect may occur and the person exposed may intentionally ignore it. Sawyer’s methods made no mention of how subjects were treated or debriefed, leaving one to wonder what effects the reactance may have had on the subjects. His experiment suggested limits to the potency of the inoculation message exist, where too much could do more harm than none at all.

The most significant finding of the Sawyer study was that refutational messages are most effective in persons who have never used the advertised brand, and in isolating a group that resists use of high selling brands. Television commercial brevity (15 and 30
second advertisements) was preferable to print publication length for communication of messages. Recall and retention were boosted by repetition as well. Mention of the competitors by name was warned against, for fear that the opposing group/idea will be specifically retained, to the detriment of the preferred message. This finding was specifically challenged (and overturned) in Michael Pfau’s work in political attack advertisements, where the two persons running for a given office are both well known, and therefore a disadvantage could be leveraged against a political opponent, leaving only one option—the other.

Hunt (1973) signaled an end to the purely academic period of Inoculation Theory, criticizing McGuire for narrow scope, and suggesting that the marketplace should be the medium of Inoculation Theory testing, not psychology undergraduate classrooms. Hunt explored the actual advertisements of the Standard Oil Company, when federally required to retract claims made about a gasoline additive. What Standard Oil actually did was run an inoculatory advertising campaign supporting their prior claims and refuting the government attacks. What he added to the literature was provocative; that refutations inoculated into the mass media should be no more specific than the attacks made. His tests suggest that there is a lower bound to sufficiency of inoculation, just as Sawyer suggested an upper bound (the level of reactance). Considered in tandem, these two experiments suggest that one would want to craft refutational messages that conservatively anticipate potential attacks, with equal levels of threat to the attacking messages. More threat equals more reactance, less responsive equals less effective. Yet despite the usefulness of these conclusions, the aim of Standard Oil was to maintain and increase sales of petroleum using fraudulent advertising and counterclaims garbling the
federal restrictions upon them. Although the experiment was sort of a “supermarket sample” kind of process, the larger question of ethical responsibility was in the seemingly nefarious use of Inoculation Theory by the Standard Oil Company, not in the researcher's methods.

Later the same year, Szybillo and Heslin (1973) also put Inoculation Theory to the test in a marketing application. Observing at the outset that credibility of source is an important variable, their test concluded that an advertiser should abandon advertising that supports the home product when it is known that a competitor is going to attack, and work to preemptively refute the coming barrage. However, if it is known that no attack will be coming, supportive advertising should continue, as this will continue to nurture a person’s preferences. It will leave that person helpless in the event of an attack, a caveat that haunts the strictly supportive format, it was (again) found. It was almost twenty years before Pfau and Burgoon (1990) applied this principle to political advertising, where currently, use of attack ads and refutations begins earlier and earlier in campaign cycles, and candidate credibility of the two major American political parties is constantly challenged.

Quereshi & Strauss (1980) took the point of view that inoculation also works in a group discussion format, taking it into a setting like a doctor’s office. Their findings are weak, due to small sample size (N=43) and a wandering hypothesis, but nonetheless imply that inoculation can occur in a small group setting. This finding suggests a role for bolstering immunization education efforts during the doctor/patient interaction. Chen & Moore (1992) looked at the nuance of involvement—one’s attention to and focus upon the experimental message. Their work suggests that persons carefully attending the
message and constructing responses are able to refute arguments well (high involvement), but not necessarily better than those persons who are casually exposed to the information, without a call to action (low involvement). The implication is that one need not tackle every issue presented by an inoculation message with immediate and salient responses. This echoes McGuire’s early work that also suggested that passive exposure forms attitude resilience, like active refutation does. But, care is warranted as Benoit (1991) showed that supportive and refutational arguments could be equivocal in their ability to counter extremely controversial topics.

In a distant echo of Stone (1969), Pfau’s (1992) video inoculation treatment was successful in delaying onset of teen smoking, but only in those with low self-esteem. It was theorized that these persons are at greatest risk, and the only interaction effect of significance was self-esteem and inoculation treatment, making his intervention different from prior efforts to discourage teens from smoking. Pfau also went a step further in testing the same audience for persistence of resistance one year later, a time frame longer than previous studies. His follow-up (Pfau & Van Bockern, 1994) showed deterioration of the effect a year later, when social pressures to smoke have caught up with teens immunized against initiation. He concludes that a year’s worth of social exposure to smoking eroded the effects of the inoculation to a zero level in the teen milieu, rendering resistance training not useful if non-continuous. The theory also broke down, according to Pfau, when the population was not interested in changing their opinions.

Pfau demonstrated the utility of Inoculation Theory in such diverse areas as political campaign communications (Pfau & Burgoon, 1990; Pfau, Kenski, Nitz, & Sorenson, 1990), and message processing simulations (Pfau, Tusing, Lee, Godbold,
Koerner, Penaloza, Hong, & Yang, 1997a). His team also offered detailed analysis of the inoculation concept, not unlike classic rhetorical methods discussed earlier, finding that receiver involvement and inoculation to avert contents of a threatening message are separate processes (Pfau, Tusing, Koerner, Lee, Godbold, Penaloza, Yang, & Hong, 1997b). They also suggested that there are disparate response paths from an inoculatory message; one for the argument, one for the attitude change. Easley, Bearden, and Teel (1995) found that attitude change followed personal revelation.

In a key study, Pfau teamed up with other Inoculation Theory researchers (Burgoon, Pfau, & Birk, 1995) to test the idea that Inoculation Theory would be best used not to change attitudes, but to bolster and maintain attitudes that already favor a particular position, company, or advocacy of an issue. Their findings expand on Pfau’s earlier work that employed a sophisticated rationale to support corporate issue campaigns (Pfau, 1992).

Others in public health have relied upon Inoculation Theory to improve their prevention-based education materials. Duryea (1983) tried to demonstrate effectiveness in an alcohol education program, with equivocal results, due to insufficient sample size (N=155). He recommended that safety education, sex education, and drug education all use this theory to predict effects. His recommendations support the idea that Inoculation Theory may offer a basis to improve provider and patient communications and mitigate the effects of negative media stories about immunization. If the medical provider could identify parents presenting for the first visit for vaccination with the first child, then special attention could be paid to strengthening their psychological disposition to favor vaccination. The vaccines and their actions are already discussed at this time, but
physicians could also suggest specific counterarguments to common misperceptions about vaccines occasionally shown by the media (Leask & Chapman, 1998). The goals of this approach should be to diminish uncertainty about the vaccines and vaccination process, because if uncertainty about the basics precludes compliance, then higher order goals, like bolstering opinions about immunization or inoculating against anti-vaccination arguments might not be met.

Not only could pro-vaccination inoculation messages be delivered at the outset of immunization, but also encouragement close to the end of the schedule could reduce patient non-compliance with the final shots. Compliance with the schedule takes two years to accomplish and maintenance of the process is known to taper off at the end (Zell, Dietz, Stevenson, Cochi, & Bruce, 1994). A booster message to encourage completion of the schedule could be made before the fourth dose of Diphtheria/Tetanus/acellular Pertussis vaccine, the final shot of and marker for successful completion of the pediatric series. Since new vaccines are also entering the schedule with regularity, reminders of the changing and improving nature of vaccines and vaccination may also be warranted, as informed persons typically express interest in receiving updated information (Maibach & Parrott, 1995).

Very few theories have been applied specifically to describe the immunization-seeking behavior of parents. The nascent Health Belief Model was applied in an attempt to understand why some persons failed to rush toward the newly developed polio vaccine (Rosenstock, Derryberry, & Carringer, 1959), concluding that social class membership was a determining factor in vaccine pursuit. The fully articulated Health Belief Model was inconclusively adapted in a small study in the search for relevant underpinning of
motivation to vaccinate in a field study (Ford & Spekman, 1981). But, the immunization
decision-making behavior of parents and their providers, outside the scope of barriers and
missed opportunities, largely has gone unaddressed, theoretically.

Fishbein & Bandura’s works were considered by Gardner, Mitchell & Staelin
(1977), who argued for Health Belief Model applications of public policy implications of
Inoculation Theory. The change in beliefs is central to their interpretation of inoculation
utility. They warn that newly formed beliefs are much easier to change than those held
for a long time, even if the long-held belief is incorrect. People tend to “go with what
they know.” These conclusions seem to have high truth-value, but the sample size in their
study was insufficient to support the conclusions reached (N=52), a disappointing fact in
light of such relevance to social marketing.

The literature of Inoculation Theory is small, but persistent. Its case history
emerged from rhetorical studies about persuasion and resistance, moved to corporate
issues management or insulation from harm, arriving at public health prevention efforts.
Key elements of Inoculation Theory include utility in health messaging, use of a high-
credibility messenger, need for boosters to maintain effects, passive exposure to
information elements, point by point refutation of expected arguments, a small temporal
gap between exposure to message and need to assert a position, and the importance of
first position in asserting a position or statement. Additional useful elements noted are
that distraction during an inoculation treatment aids in forming strong responses,
conservative messaging approaches can help avoid reactance (a real potential confounder
to a strongly worded refutation), that repetition aids recall, and that Inoculation Theory
would likely have no impact on those with specific, strongly held beliefs against immunization.

Yet Inoculation Theory never has been applied to the core public health concern from which it derives its name, despite a recent call for its use in this context (Parrott, Egbert, Anderton, & Sefcovic, 2002). Application of Inoculation Theory to childhood immunization would represent a foundational change from current creatively derived, but atheoretical CDC population vaccination media strategy (Immunize On Time. Your Baby is Counting on You.). One place the present strategy falls pointedly short is in its inability to address the concerns of parents who question the need for vaccinations on a variety of bases, for example homeopathic inclination, uncertainty, mistrust of the government. The ubiquity of health related materials in the media and on the Internet could be frustratingly overwhelming to investigate, to understand, and to make decisions after reading. Printed immunization materials developed by CDC are already distributed to virtually every pediatric doctor and health care facility in the United States, and inoculation messages could easily be incorporated into the scripts these professionals use when explaining the vaccinations about to be given. As these printed materials are required by law to be provided to the parents/guardians at every vaccination visit, a system is in place to distribute this information. Inoculation Theory suggests how to do it and the Prislin data of the 10 most common reasons that people give for not vaccinating their child, suggests what to do. For these reasons, a study to test the Prislin data coupled with a theoretically based call to action was proposed. Inoculation Theory is the intervention theory of choice, for the aforementioned reasons, and comparison with a large-scale public health effort provides a control present in the *status quo*. 
Conduct of a study to investigate this need as an initial use of Inoculation Theory applied to public health education on immunization should not be done, if it cannot be ethically justified. The next section addresses some ethical and policy implications in health communication, in the context of the proposed intervention.

**Ethical and Policy Implications of Inoculation Theory Usage**

Inquiry into ethics is important to any health intervention using a theoretical basis for health promotion. Even so, no mention was made in the early period of Inoculation Theory development in over a dozen articles by McGuire himself or with his collaborators (Papageorgis & McGuire, 1961; Papageorgis, 1968; McGuire & Millman, 1965), or other researchers of this era, including Manis and Blake (1963), Festinger and Maccoby (1964), Kiesler and Kiesler (1964), or Stone (1969) of consent procedures, and rarely were students told of the true nature of the experiments, other than the ersatz purpose of assessing reading and comprehension skills. Granted, these studies were conducted prior to the current era of informed consent, but as these were usually health topics covered, ethical concern certainly could have been stimulated over manipulation of student attitudes toward personal hygiene. A thorough debriefing might have served this purpose, but no such event was documented.

Notably absent from more recent discussions of effects, implications to findings, and suggestions for further research are ethical considerations of persuasion or reinforcement messages communicated as national policy. Although Pfau extensively debriefs participants as to the nature of his experiments, the application of his findings on smoking, outside a student milieu, are discussed in terms of education and replication, not in ethical implications.
Ethics in research and interventions should be integral to health communication (Kromrey, 1993), but are not consistently on the list. The Ottawa Charter for Health Promotion (World Health Organization, 1986), an international document of understanding for proper conduct of health promotion activities, contains no mention of ethics. Gillon (1990) asks how much doctors should “lean-on” patients to accept routine vaccinations in the face of parental refusal. In a study of the impact of the Philippine mass-vaccination communications campaign, none of the survey questions related to ethical issues such as informed consent or refusal to vaccinate (Zimicki, Hornik, Verzosa, Hernandez, deGuzman, Dayrit, Fausto, Lee, & Abad, 1994; McDivitt, Zimicki, & Hornik, 1997). In a meta study of evidence for the parental assertion that multiple vaccines could damage the child’s immune system (Offit, Quarles, Gerber, Hackett, Marcuse, Kollman, Gellin, & Landry, 2002), the ethical dimension of defeating one of the primary arguments of parental refusal to vaccinate was unaddressed.

In pro-immunization materials and publications, one might expect the dominant voices to ethically and comfortably communicate risk and benefit of vaccines. But, communication is difficult in the face of very small, but measurable, risks of vaccine-induced disease in an environment of near absence of natural disease (Stoto, Evans, & Bostrom, 1998). Nonetheless, statements are required by law to be handed out to each caregiver before their child is vaccinated (42 USC Sec.300 aa-26).

Campbell (1990) looked at ethics in terms of who gains as a result of the promotional effort. In his view there can be no room for political or financial gain as a result of health promotion, however well intentioned. In the U.S. immunization promotion of the 1990s, both of these conditions were violated when, for example,
President Bill Clinton inaugurated the Childhood Immunization Initiative (CDC, 1994b) early in his Presidency (also championed by President George Bush some years prior), and since pharmaceutical manufacturers are known to profit from vaccine sales. More vaccines equal more profits. Every appearance of concern is made for the welfare of the individuals who actually acquire diseases from these vaccines, but the tales of these persons can be a threat to manufacturers. Although society could be said to gain from the conquest of diseases, and individuals gain from decreased morbidity and mortality, social prices include political grandstanding and drug company profiteering.

Persuasion to immunize is to request capitulation to the social norm of immunization. Smith (1997) reviewed several forms of immunization social marketing, noting that the persuasive fear appeal is the most common method for encouraging parents to immunize their child. Guttman, concerned over the difference between persuasion and coercion (Guttman, Kegler, & McLeroy, 1996) could be addressed with this logic: harm to society and the individual can occur from collective but autonomous refusal to participate in mass vaccination. But, consent procedures are in place to allow for exemption with given cause, based upon personal beliefs. And, the Vaccine Adverse Event Reporting System (VAERS) exists as a safety net to catalog vaccine induced injuries, for children who are actually harmed by vaccination. The extensive VAERS website at http://www.vaers.com (accessed March 8, 2003) offers a complete explanation of the legal recourse that parents have, if an adverse event does occur, from reporting, through adjudication, to compensation.

If the majority of Americans are engaging in the desired behavior under the current system of health promotion, then the remainder who do not may need a different
means of persuasion. Persuasion techniques that use fear are employed for social justice in this area, are designed to motivate but not to do harm. Witte (1994) might label such justification as manipulative, but Guttman, always a strong proponent of inclusion, would probably recommend using targeting and segmentation to identify those persons missed by mass marketing (Guttman, 1997), nonvaccinators, or those who are significantly behind in their shots for reasons other than religious or personal preference. Those who are firmly against immunization for religious reasons should not be shamed or ostracized for their nonparticipation, and it was not the purpose of this study to refute exemption from vaccination on these grounds. Those behind for indolent reasons are unlikely candidates for persuasion in other than personally relevant ways (Kreps, O'Hair, & Clowers, 1994). But should society compel the practice of good health? What is the moral criterion used to weigh the social desirability of compliance with the childhood immunization schedule? The cornerstone of modern public health rests on social acceptance of personal behavior modification when matriculating in a social context, a form of Locke’s Social Contract. And the sanctions nonvaccinators experience, again in the status quo, are delayed or denied school entry, or day care eligibility. Persons remain free to exempt themselves from these requirements, but at a socially approved cost. If 90 percent of the population is vaccinated, the other 10 percent can “free ride” with little reason to worry (Atkinson et al., 1999). But, if antivaccine movements become more popular, then this herd immunity concept breaks down and epidemics of disease return. As vaccines are not 100 percent effective, some persons who were immunized then fall into jeopardy of infection, brought on (in part) by nonvaccinators. Communications that specifically target those at the margins are therefore morally ratified.
In the mid 1950s, mass immunization campaigns promoted an ideal never before possible: public freedom from polio. That some children acquired polio from the immunization seemed a natural and acceptable price to pay for the exemption of thousands, to a nation just emerged from a war where similar ethics prevailed. Now, with the introduction of over a dozen vaccines, the fact that many diseases are at the lowest levels in history, and if coupled with persuasive communications based upon Inoculation Theory, perhaps vaccination programs could complete their missions of disease eradication. Some improvement over public service fear appeals is needed before Generation Xers, now of reproductive age and known for political and personal apathy (Halstead, 1999), join those opposed to mass vaccination en masse. The potential drop in vaccination acceptance could well pave the path for the microbes to return. When discussing childhood immunization communications policy, inquiry into ethical application of any theoretical basis seems warranted.

The Society for Public Health Education (SOPHE) provides an updated Code of Ethics (American School Health Association, 2000; Capwell, Smith, Shirreffs, & Olsen, 2000) that calls for use of theory under Article 3, section two as part of the obligation of public health educators when carrying out their duties. The SOPHE Code of Ethics is considered the gold standard under which ethical conduct of public health interventions are measured. It indicates that the use of theory is all but mandatory in appropriate discharge of public health function in communications.

Media Roles in Childhood Immunization

The media play a role in disseminating information and stories about immunization. Health communications at CDC describe use of the media channel under
the definition of policy communication, rather than of broad, reinforced education. Inquiry into the channel of media education reveals the utility of the popular press and journals as educators on vaccine perception, portrayal, advocacy, and safety. Thorough environmental scanning of media constitutes an important way to gauge unexpected swings in opinion upon a survey of attitudes toward childhood immunization. In the study, the possibility of a media story that attacks vaccination was present (even likely); therefore a means to systematically harvest media stories on vaccine topics was needed to watch for such an event, to temporally log it for later potential correlation with the incoming responses. Use of a media compilation service provided a compact and systematic means of gauging the media environment around vaccine topics, and a brief, examination of coverage was undertaken as a pre-experimental method of gauging its utility. The National Network for Immunization Information (NNII) is available by website at http://www.immunizationinfo.com (accessed March 8, 2003). It offers an environmental scan of major national and international daily newspapers and academic journals for vaccine related topics, and publishes a thrice-weekly list of abstracts and citations. The service averages 30 stories a week, for an annual total of approximately 1,500 articles.

The purpose of the undertaking was to develop an awareness of vaccine related issues as they are portrayed in the media, and thereby come to the attention of immunization decision-makers. Danovaro-Holliday, Wood, and LeBaron (2002) noted the media swiftly change from pro to anti immunization sentiment, when data become available that contradict a vaccine recommendation, as was the case with a new rotavirus vaccine in 2000. Health communications that support immunization must be prepared to
answer challenges from the media environment, and doing so should be predicated upon regular, systematic environmental scanning of issues and topics reported. Of particular interest to the researcher were fear appeal messages, as these are perceived as motivational by some researchers (Boster & Mongeau, 1984; James & Hensel, 1991), and are certainly the fodder of news stories.

Persons coming into a clinic for well-child care may have opinions colored by a recent media story. The effect of the story may have increased knowledge or interest in the subject, possibly motivating the clinic visit. A contrary effect may be apprehension of immunization engendered by a story of a child purportedly damaged by an infant vaccine. A poster with immunization content could have come under scrutiny in response to a story for or against immunization, and changed the respondent’s answers on the pre or posttest in this study. The researcher monitored the media during the period of the study, using the NNII service, logged the content, and tallied local and national stories for use in ascertaining media effects upon instrument responses.

Incorporating Behavioral Theory into the CDC Health Communication Paradigm

Health communications, as a discipline, twines the societal and interpersonal communications efforts together, to persuade, train, or inform persons about health topics (Kreps & Thornton, 1992). Health communications is a subset of social marketing, “the art and science of promoting planned, targeted social change” according to Kotler and Roberto (1989). Unlike business, which seeks to attract consumers for profit, social marketing seeks to facilitate healthy living choices for the improvement of the individual and for society. Markers that describe persons, such as socioeconomic status;
psychodemographic profile; or knowledge, attitudes, and beliefs (Kotler & Roberto, 1989) are employed by social marketing as keys to unlock ways to influence persons to choose healthy lifestyles. Health communications is also related to health promotion and health education, which seek to motivate behaviors, but differ from one another in mechanism and effect. To Downie (1990), health education is distinct from health promotion; he views health education as transformative, where the educated person adopts and eventually models healthy living choices. Within health promotion, on the other hand, theory and praxis are linked, but separated by several factors. Downie also views promotion as talking 'at' (a paternal function) and education as talking 'with' (a fraternal function). Practitioners of health promotion may be caught up in political, deliverable, and approval/clearance issues, whereas theorists of health promotion may need to adapt or develop understanding on a topic to properly experiment with interventions. Both are constrained by funding and timing. The uneasy transition from theory to practice in health promotion has resulted in a call for closer collaboration of both 'sides' to understand each other's contributions (Burdine & McLeroy, 1992). Health education and health promotion have yet to suffuse the use of theory consistently into health communications, which is still driven by consumer opinion and market testing (Glanz, Lewis, & Rimer, 1997).

Health communications at CDC suffers from theoretical-basis anemia, but could include theory if a sufficiently strong case were made. In 1993, CDC released an evaluation of Agency-wide communications activities. One of the results of this process was the development of Health Communications Wheel; a map to guide communications
of the Agency and to give structure and homogeneity among the Centers, Institutes, and Offices. It is in consistent use, and is made up of ten steps and actions, summarized here:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
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<tbody>
<tr>
<td>1.)</td>
<td>Review background information - environmental scanning, disease surveillance</td>
</tr>
<tr>
<td>2.)</td>
<td>Set communication objectives - clear, time-specific, measurable, attainable goals</td>
</tr>
<tr>
<td>3.)</td>
<td>Analyze and segment target audiences – demographics, socioeconomic status</td>
</tr>
<tr>
<td>4.)</td>
<td>Identify message concepts and pretest - literature review, focus groups</td>
</tr>
<tr>
<td>5.)</td>
<td>Select communication channels - credible, accessible mix of outlets</td>
</tr>
<tr>
<td>6.)</td>
<td>Create messages and materials and pretest - multiple formats and options</td>
</tr>
<tr>
<td>7.)</td>
<td>Develop promotion plan - describe audience, methods, support, timetable</td>
</tr>
<tr>
<td>8.)</td>
<td>Implement communication strategies - outreach, gatekeepers, process measures</td>
</tr>
<tr>
<td>9.)</td>
<td>Assess effects - outcome equals short term, impact equals long-term effects</td>
</tr>
<tr>
<td>10.)</td>
<td>Feedback - strengths/weaknesses analysis, change, improvement  (Roper, 1993)</td>
</tr>
</tbody>
</table>

Note the absence of theory as driver of the intervention. If the findings of this study are consistent with the Principle Hypothesis, the results will form the basis of a recommendation to CDC to modify the Health Communications Wheel in a small, but important way. Evidence that supports the addition of theory to the CDC Health Communications paradigm to facilitate predictability of results and generalizability is a programmatic concern that CDC could consider. The development would move health communications more toward the parent fields of health promotion and health education.

Tangible program results, like improved immunization rates, are hard to attribute to health campaigns efforts alone, as the tapestry of media, policy, program, and communications at all levels make the effects of single elements hard to discern uniquely.
Cultivation Theory, an antecedent approach to Inoculation Theory, suggests that it takes time for the ideas the media sows to sprout in people's minds (Morgan & Shanahan, 1996). Inoculation Theory suggests that persuasion or counterpersuasion requires maintenance to persist (McGuire, 1966). A system of integrated health communications that cuts across many health behaviors, supported broadly by the media, driven by theory and integrated with the efforts others in public and private sectors would be the best use of scarce programmatic and communication resources. An important goal of this study is to add the consideration of theory to health communications efforts by CDC, in this case by demonstrating that use of a particular theory can effectively motivate and sustain a desired behavior in a specific intervention.

The purpose of this Review of the Literature was to describe the genesis of Inoculation Theory, and trace its evolution from monitoring student health habits into a powerful tool to motivate behavior defense and maintenance. Articulation of constructs and subscales of measurement never occurred in this theory, nevertheless, certain testable principles were developed and applied over a half century of academic, private sector, and public health study and use. Exploration into its ethical application suggests that a society likely does not disenfranchise its citizens while seeking to compel a socially desirable, population-based health behavior. Potential fusion of intervention effects with media effects requires that media be independently monitored during the course of a study to note possible occasions of influence upon study results. In the following Methods section, the proposed study will be laid out to address these issues under the aegis of the Research Question.
CHAPTER 3

METHODS

Research Question

Kim Witte (1996) supplied the foundation for the Research Question when she asked: “Does using empirically grounded theory in message development work better than creative inspiration and common sense alone?” To reflect the Inoculation Theory literature in addressing the posed quandary, this study focused on the following Research Question: Is a childhood immunization poster, located in a medical clinic and based upon Inoculation Theory more likely to change parental attitudes toward immunization, than a creative, but non-theoretically derived poster in the same setting?

The principle Hypothesis tested was that: Parental attitudes toward and recall of immunization messages about a child’s pain, number of shots, or ability of the child to receive shots while ill will be stronger after passive exposure to an Inoculation Theory-based message than those stimulated by passive exposure to a creative, but non-theoretically derived message.

Subject Selection and Setting

The participants in this study were the parents, grandparents and caregivers of children, who were seeking well-child care in a private medical clinic. All persons who entered the clinic during the duration of the study with their child/children for the purpose of well-child care were approached to participate in the study. The setting for the study
was the offices of a private medical clinic in Georgia. The offices are in Lawrenceville, a suburban town 20 miles northeast of Atlanta. The doctors there see an average of 100 patients a day for well and sick child care, approximately 50 of whom are there for immunizations. The clinic has separate waiting rooms for sick and well children. The waiting room walls have windows and bulletin boards with pictures of the children of the medical staff and medical news and notes. When a parent and child enter the clinic, they sign a sheet and verify their insurance coverage with the receptionist, and then move to one of the two waiting areas. Once a child’s name is called, the parent and child are admitted to an examination room that contains a sink, examination table, a side chair, and often a basket of toys and books. The walls are generally bare, with the exception of posted notices in some rooms of availability of experimental treatments for childhood ailments, or occasionally a picture. This lack of distraction provided a focus of interest for the inoculation poster that was placed on the wall or back of the examination room door. Only a few persons refused to participate, and their unmeasured exposure to a poster took place as would typically happen in this clinic.

Within this setting, the following clinical procedure ensues. When one’s name is called, the parent and child go to the specified examination room, and are met there by a nurse who takes the child’s temperature and listens to the reason the child is there. In well child visits, height and weight are measured and the nurse distributes a well child questionnaire and patient education materials on poisoning, burns, drowning and the like. The initial meeting and note taking are done with the door open. Once the nurse has ascertained the reason for the visit, the door is closed and the child and parent wait for the doctor. The waiting period can be as short as five minutes, or as long as thirty. The doctor
knocks and enters, examines the patient, administers the needed care, offers advice or prescriptions, then departs. The nurse returns and gives the shots (if indicated) or concludes the visit, pointing the parent in the direction of payment and egress.

**Intervention Description**

Passive exposure to the inoculation poster occurred during the interval after the nurse screened the child and prior to the arrival of the doctor (5 to 30 minutes in time), while the door was closed in the examination room. The rooms were screened and stripped of other immunization-related material prior to the experiment. During the experiment either the Inoculation Theory-based poster (Baby Shot Time?) or the control (Immunize on Time. Your Baby is Counting on You.) was displayed in the exam room. Prior to initiation of the study, a manipulation check was conducted to confirm that the two posters were perceived as different from one another. Recall that Hunt (1973) indicated that passive exposure to arguments is just as effective as active exposure, supporting this choice of method. Additionally, a poster on the wall or back of a doctor’s door is a realistic phenomenon, thus mimicking the natural setting of the typical public health poster. To control for unintended effects, the experimental poster mirrored the colors, images, type fonts and size used in the CDC public health poster. Why a poster? Broad use, cheap reproduction and distribution, controlled literacy levels, and durability are reasons to choose this medium. Doctors and nurses are the primary gatekeepers of the immunization process, and by extension, their offices form a primary resource that parents tap when seeking information about immunization. Immunization information is inherently technical, and difficult to convert into lay terms. The Vaccine Information Statements given at every shot visit do this, but are mandated by law to explain, not to
socially encourage or reinforce immunizing behavior. Posters have been used for over a century to communicate about health issues in memorable ways (Jowett & O’Donnell, 1999). Although certainly limited in their ability to reach beyond their physical location, posters play a role in information dissemination and advocacy.

The original CDC poster served as a control to the Inoculation Theory-based poster in this experiment, as the medical setting within which the experiment was conducted, like many, displayed several pro-health messages in its facility. For messages to result in action, they must at a minimum, communicate memorably. In creative work, the Call to Action is expressed in the thesis or seminal message, called a tagline. This tagline and key messages are usually subjected to qualitative scrutiny to test its motivational power in targeted audience segments at whom the intervention is aimed, or to whom the messages are uniquely intended to reach (National Institutes of Health, 1992). The opinions of persons reviewing it, and of the sponsoring organizations, form the basis for selection, rather than theory. The principle communications objective of the control poster is to point out the number of shots needed to immunize a child, and the diseases they prevent, by name.

Research Design

The Nonequivalent Control Group Design (Campbell & Stanley, 1963) was employed in this study. Before a CDC campaign using Inoculation Theory could be implemented at a state, national, or international level, Salmon (1989) suggests that empirical evidence is needed. Of value are results that demonstrate:

1.) Theory-based approaches are more likely to engender recall and therefore action to immunize over creatively derived approaches, and
2.) Materials used to reinforce the social norm of immunization and offer pretext to reject arguments that impugn vaccination can be measured in a clinical setting.

Persons who came with children for well-child care were approached to participate in this study. Exposure to one condition or the other follows this design:

**Patients and Parents**

<table>
<thead>
<tr>
<th>R</th>
<th>Poster 1 (n = 340)</th>
<th>O1</th>
<th>X1</th>
<th>O2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Intervention)

<table>
<thead>
<tr>
<th>N = 680</th>
<th>R</th>
<th>Poster 2 (n = 340)</th>
<th>O3</th>
<th>X2</th>
<th>O4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Control)

Persons who come to this clinic for urgent medical care are assigned to a doctor who is on duty that day and may or may not be their main pediatric provider. The doctors also rotate between the upstairs and downstairs portions of this clinic. On any given day, the posters in the exam rooms could be the experiment or the control items. Therefore, an element of randomness was present in whether the persons were assigned to an experiment group or a control group, but this was not under the control of the researcher.

Federally sponsored health promotion posters are ubiquitous at this, and indeed many medical clinics, and are therefore seen as a natural inhabitant of waiting and examination rooms. The deliberate placement of experimental posters among other materials only affected the organization, not the presence of typical posters in this clinical setting. Some distraction is also useful in drawing attention to inoculation materials, as was suggested before, so this was not a problem, and could have been a bonus.

Assignment to a study condition was restricted to those persons who came to this clinic on the days the researcher was present to conduct the study. The time frame for this study was the four months leading up to and shortly after the beginning of a typical
school year (July 2002 through October 2002). Generalizability is restricted to family practice medical clinics with similar insurance acceptance and patient profiles. The reasons this design was selected over the Pretest-Posttest Control Group design are: 1. the experiment compared an existing intervention with a proposed one, and 2. persons may have come to the clinic in ways that were not truly random, so the two groups may not have been perfectly equivalent. To demonstrate relative homogeneity between the experimental and control populations, a comparison of items (between O1 and O3 on the pretests) yielded values that were very nearly identical, as expected. Comparisons of pre and post exposure responses within groups showed passive exposure changed a persons response, a marker for attitude, toward immunization by intervention. It also showed the degree of change on the three areas that give parents most pause in their immunization decision making: numbers of shots, well or sick status on the day the child is to receive shots, and momentary pain associated with vaccine injection, as anticipated. (The original CDC poster focused solely on the number of shots; two other elements were added to the experimental treatment.) Correlations and crosstabulations were also analyzed to reveal relationships between study questions and demographic characteristics.

Measures and Instruments

The materials consisted of the following: Consent Form (Appendix B), Postcard Reminder (Appendix C), Manipulation Check (Appendix D), Debriefer (Appendix E), Experimental Poster 1 (Appendix G), Control Poster 2 (Appendix H), Pretest (Appendix I), and Posttest (Appendix J). The pretest recorded demographic information including name, address, parent age, ethnicity, gender of the participant, and child’s age. The first eleven questions on the pretest were measured on a five point Likert-type scale
from “1” Strongly Disagree to “5” Strongly Agree, with the midpoint being “Unsure.” Question 12 and Question 13 on the posttest were answered with a Yes or No, to assess media exposure within the past two weeks. Five point Likert-type scales and yes/no questions were chosen to mirror McGuire’s work (McGuire, 1964).

Recall the key findings from Prislin et al. (1998) that formed a basis for the core messages of this study. Items 3, 4, 5, 9, 10, and 11 are related to these findings on the inoculation poster, on the issues of pain, number of shots in the childhood immunization schedule and minor illness contraindications, and these constituted the key comparison issues in parental vaccine decision making. The first question was a reference point for the importance of immunization, to establish saliency of the issue. Inoculation Theory works best when the issue is related to health and is a social norm, defined as approximately 80 percent or more of respondents indicating Agree and Strongly Agree (combined); the commonly accepted level in McGuire’s experiments (McGuire, 1964). The second question addressed vaccine safety as a concern of a new parent, a prominent and typical feature of fear appeal based social marketing of immunization. It was also designed as a backup and corollary to the 7th question on risk and benefit. Question 6 was about the trust between parent and caregiver, and was anticipated to correlate highly with the previous three questions. Question 8 asked about understanding of immune system and how vaccination plays into parental anxieties about good health. Question 12 examined contamination of responses, as potentially influenced by recent viewing of a TV or newspaper story on immunization. Question 13 on the Posttest asked if direct recall of the poster occurred (Appendix J). The total time involvement between initiation of contact and completion of the first survey was 5 –7 minutes.
The effect of testing on sensitizing the participants to the subject of interest was of diminished consequence for several reasons:

1.) The pretest occurred in the waiting room, prior to the doctor visit in the examination room. Since a few days passed between exposure to the first instrument and exposure to the second instrument (the time it took for a questionnaire to come in the mail), it was expected that the participants had little, if any memory of the specific responses made to the first instrument.

2.) If memory of the specific questions occurred, their content was likely be at a low cognitive level, since Fleish Kincaid scores of both surveys show them to read at the 5.9 grade level.

3.) As this wasn’t time series analysis, the maximum number of times the instrument was seen is twice, all pointing to a low possibility of testing effects. To the extent possible, the researcher screened out persons from being surveyed twice (e.g. due to a parent and child returning for a follow up visit or some other reason).

Recall that the media environment was scanned during the entire period of the study, and that negative and positive stories about immunization are constantly in play. This research was conducted during the late summer and early fall of 2002, when the media effects of “Don’t Forget your Child’s Shots” type of news stories typically occur supportively in the environment. One could reasonably expect the environment itself to provide some psycho-educational attacks and supports of immunization, ideal conditions under which immunization attitudes can be subjected to counter attitudinal refutation, or support.
Data Collection Procedures

The researcher was present in the waiting room as people arrived at the clinic. After parents arrived, signed in, and took their place in the waiting room, the researcher approached them with the University of Georgia Institutional Review Board approved consent form and first questionnaire, and verbally invited them to take part in the research. If they agreed, the consent form was discussed, signed and returned, and the survey administered. Each pair of surveys (pre and post) was numbered, to facilitate tracking responses between first administration and second. The researcher was present to answer questions, but the parent (or caregiver) filled out the survey unassisted. The researcher then asked permission to send a follow up survey in a week, to complete the research. If the participant agreed, the researcher thanked him or her, and got the address to which a follow-up survey could be sent. Participants completed the survey prior to admission to the treatment rooms and the arrival of the doctor.

The doctors at the clinic were instructed to respond to patient questions about immunization as they normally would, but to defer questions about the survey in particular to the researcher, whose name and phone number were listed on the informed consent document, a copy of which was provided to each participant. As the social norm for immunization is extraordinarily high, exposure to the survey and poster were not expected to have a negative impact on immunization decision-making in the context of well-child care, an item of ethical concern.

One week after each patient and parent left the clinic, a letter was mailed to participants containing a follow-up survey. Inoculation Theory indicates that it takes a few days for an effect to become fully manifest, thus the reason for a mailed second
survey. The posttest was completed in the homes of the participants in the research. The question set from the pretest was duplicated, but the demographic data section was omitted, since that information had been previously given. The same tracking number was placed on the original and follow-up survey to aid the researcher in assuring that the two data sets were tracked and recorded properly during data collection and data entry. Although the data were examined in the aggregate to see if there were effects between the pre and post conditions attributable to the posters, the within-person variance was also of interest, to see if an individual moved from one extreme to the other. Two additional questions were added to the posttest: Name of the child’s doctor, and a yes/no question asking if they recall seeing an immunization poster of any kind during their visit. As it is known whether the respondent visited at a time when either the experimental or control poster was up, the dependent measure of recall can be correlated to the poster seen, addressing the principle hypothesis. The name of the doctor was solicited in order to provide feedback to the clinic on the relationship between specific doctor and patient, on the trust question (Question 6). After the posttest survey was completed, it was to be placed into an enclosed postage paid envelope and returned to the researcher. Participants who did not return surveys within 7 – 10 days were sent a reminder postcard. The total time for a participant to open the mail, fill out, enclose, seal, and drop the return survey in the mail was expected to run 5 – 7 minutes. Forty to fifty pretests a day were completed during the duration of the study. After the pre and posttests were entered into the statistical analysis software, the original forms were stripped of personal identifiers and retained confidentially in a locked file cabinet.
During the entire period of the intervention, the National Immunization Information Network was monitored for immunization related stories. Abstracts of those stories, publication name, and date was collected and electronically stored. Although no story ran of national scope, or in the local area, care was taken to listen for questions related to the news in the clinic setting by the researcher to ascertain the influence and content of immunization related news.

Manipulation Check

The purpose of the manipulation check was to insure that the survey was measuring what it was designed to measure, based upon Yes/No responses to several questions. The Lawrenceville clinic is subdivided into an upstairs and a downstairs section. The primary study, involving poster placement and clinic procedures that facilitated the process, occurred in the downstairs area. The upstairs area is reached through a separate entrance and parking lot. Again, all persons presenting for well-child care were asked to participate, and a total of 55 took the manipulation check, prior to initiation of the main study. The same procedures for consent took place as described above. All persons were shown both posters. Questions 3, 5, and 6 were identical to the questions on the pretest about temporary pain, numbers of shots, and minor illness contraindication. This portion of the check was to ensure that the poster was communicating about the ideas that the researcher was attempting to measure. Questions 1, 2, and 4 asked about the art and text specifically, to verify that posters were perceived as different. Question 7 asked if the person “got it” with an unspecified open ended possibility for comments on the two posters at the bottom of the form. These responses were examined to see if the messages were clear in the three questions of interest (3, 5,
and 6). The Fleish/Kincaid grade level of the Manipulation Check was 4.7. If people were unable to tell the difference between the Experiment and Control posters, the former would have been redesigned and subjected to another manipulation check. Demographic information including age, child’s age, gender and ethnicity were gathered to compare those who evaluated the posters during the manipulation check, and those who later took the pretest.

Data Analysis

Power analysis indicates that to find small effects, defined by Keppel (1991) as an omega squared (\(\omega^2\)) of .01 - .06, (or eta squared (\(\eta^2\)) of the same value range) at a power of .80, and a p value for significance set at .05, 271 persons each were needed for the control and the experimental groups. Assuming that 25% do not return the posttest, the total recruited to reach the desired total of completed pre and post tests is 542 (271/condition X 2 conditions) + 136 (25% nonresponse rate) = 678. To attain the greatest chance of reaching this power, 340 were recruited for each group in the hopes of at least getting the 271/condition needed, as specified. A 25% nonresponse rate is considered low by Keppel (1991) but the researcher was optimistic that the short time needed to fill out both instruments would encourage compliance.

Completed surveys were entered and examined with statistical analysis software. First, the descriptive statistics were run, that revealed means and standard deviations of responses, as well as totals for gender of participants, age of respondents and children, religious affiliations, and ethnicity. Then to compare pre and post test values, analysis of variance (ANOVA) techniques were applied, followed by cross-tabulation and correlation analysis to examine the relatedness between scores of elements in the two
conditions, to mirror the typical statistical analysis performed under McGuire. By adding ANOVA and a larger sample size than was typical during the early experimentation era, small and medium effect sizes ($\omega^2 = .01 -.06$) were discernable. The effects of the media environment were also be considered; if irregularity had been seen during the course of the interviews, correlation between responses and content of the media event would have been examined further.

Group effects were discernable from the number of posttests returned, but the within-person variance, that is, the change of an individual’s behavior from pre to post test, would not have been possible to measure without the completed posttest. Prompting during the pretest, when the participant and researcher were together in the waiting room, and reminder cards sent to solicit completed second surveys were designed to maximize the number of returned posttests.

The study took four months to conduct, and data input was sequential, as it was received, using a paired number scheme between pretests and posttests. Again, once both pretest and posttest data were entered, original identifiers were obscured, to prevent later identification of participants.

In a key elaboration of Inoculation Theory, Zimbardo and Leippe (1991) suggested that attitudes and intentions to act likely turn into behaviors. As the instruments used in this study asked about intention, agreement and disagreement with the questions of interest, there may be a basis to infer that the responses made and the intentions they represent are potential behavior influence moments. If a message resonates weakly for or against a question, there may be room to change or increase the valence of the response. Pfau did as much when warning teens not to smoke, even if his intervention wore off in a
year (Pfau & Van Bockern, 1994). Since the analysis showed that agreement could be stimulated or augmented with inoculation, as was expected, and even if the effects are mildly transient, there may still be enough time for a child to complete the immunization series prior to the effect wearing off for the parent.

Limitations

Response contamination was not a problem, since the regular intake of clients is controlled by appointment times every ten minutes, and persons generally left immediately after the appointment, and did not sit around in the waiting room to talk with one another after appointments. Persons without regular home addresses (garnered for the follow-up survey) were included in the sample, and diminished the number of returned surveys. If a major media story had aired during the period of the study, it could have effected how persons thought about immunization, although since the survey was administered in an environment where parents have elected to bring their children for well-baby care, this effect may not have been measurable with the current instrument. (Those opting not to vaccinate would not be present.) Of ethical concern, the materials present on the back of the door were challenged by a statement that verges on attacking immunization during the administration of the posttest, and response to any further questions prompted by this quandary will probably fall upon the staff to answer at the medical clinic the researcher used. A supply of provaccination materials and debriefers on the study itself were left at the conclusion of each day the researcher was present to assist clinic staff if that information was needed.

The confounders of maturation and history were minimal, and the effects of history were presumed to be equivalent, across the population. If a major news story
about immunization had occurred during the time of the study, both control and experiment groups were expected to hear of it *ceteris paribus*. It could have skewed the data, but should have done so in equivalent ways across both groups.
CHAPTER 4

RESULTS

Manipulation Check

A total of 55 caregivers of children completed responses to the manipulation check during the summer of 2002. The key point of a manipulation check is to sample a similar subset of the proposed study participants, attempting to match them on the demographic variables of gender, ethnicity, age and age of child, and expose them to the main variables of the study to see if they are perceived differently enough to render useful statistical measures. The first question of the manipulation check was to see if the two posters were the same, as a dichotomous (true/false) response. Over 87% of respondents saw the two posters as different, indicating that measures that compared the two posters could reasonably be expected to differ. After looking at both posters, 100% of respondents thought that the posters gave many reasons for a child to receive shots on time, and all but one of the respondents thought that the posters showed that the benefits of shots outweighed the discomforts. This suggested that the primary messages were understood as written, and that a basis for comparison could rest on the memorability of message, rather than believability, or other problem, in the contents.

Both the experimental and control posters feature the same non-White child, wrapped in a warm blanket as an attractive visual reason to look at the poster (see Appendix G and H for samples). When persons were asked if the picture of the child was memorable, 72.7% of respondents agreed (n=40). A majority of respondents (n=29)
indicated a positive response to the true/false question, “There are over a dozen shots in the childhood immunization schedule now,” but that question may have generated some confusion, since one poster clearly indicated there were 18, but the other poster only listed nine diseases. These two concepts, when presented simultaneously, seemed contradictory, except to a very few parents who commented that they understood that some diseases required multiple shots to fully immunize a child, thus increasing the number between what was portrayed on one poster, to that expressed on the other. Since the fact, and not the comparison was of interest to the researcher, this confusion was not deemed a potential issue with the upcoming conduct of the study.

On the issue of a minor illness not disqualifying a child from immunization, the same percentage agreed (52.7%) with the true/false statement, again possibly indicating specific differences between the two posters, that when viewed together, may have confused rather than prompting a response based upon information directly revealed by the posters.

Eight respondents were male (14.5%) and 47 were female (85.5%). The ethnic breakdown of participants is reported in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>10</td>
<td>18.2</td>
</tr>
<tr>
<td>Hispanic</td>
<td>4</td>
<td>7.3</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>38</td>
<td>69.1</td>
</tr>
<tr>
<td>Asian</td>
<td>3</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>55</td>
<td>100.0</td>
</tr>
</tbody>
</table>
The median parental age was 35 and the median child age was 3 years. When these measures, and ethnic and gender breakdown of manipulation check respondents are compared to persons who took the subsequent survey, an almost identical match on all four variables occurred. This high level of correspondence is helpful in ensuring that the same type and frequency of participants who responded to the manipulation check also took the actual study questionnaires. As there appeared to be sufficient difference between the two posters, and compelling evidence that the key questions of interest could result in meaningful variance measures, the researcher concluded that the study could begin without alteration of the materials.

Description of the Study Population

A total of 680 caregivers of children: parents, grandparents, other relatives, or guardians completed pretests during the summer of 2002, divided evenly between experiment and control groups. Of those, 113 from the experimental group completed and returned posttests, and 107 from the control group did the same, for a total of 220. This represents a 40.5% return rate against the original power calculation of 542 (271 per condition). A total of 76 males (11.2%) and 604 females (88.8%) completed the surveys. Ethnic breakdown of participants, and comparison to Gwinnett County U.S. Census figures, is reported in Table 2.

The person reporting in the “other” category was from the West Indies. When compared to the Gwinnett County U.S. Census figures, greater than the average numbers of African-Americans and Whites visited the clinic during the period of the study, and fewer than average Hispanics and Asians visited the clinic. This result could be due to the
Table 2

*Study Respondent Ethnicity and US Census Comparison*

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Study Frequency</th>
<th>Study Percent</th>
<th>2000 US Census* (Gwinnett)</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>104</td>
<td>15.3</td>
<td>13</td>
</tr>
<tr>
<td>Hispanic</td>
<td>42</td>
<td>6.2</td>
<td>11</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>493</td>
<td>72.5</td>
<td>67</td>
</tr>
<tr>
<td>Asian</td>
<td>40</td>
<td>5.9</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>.1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>680</strong></td>
<td><strong>100.0</strong></td>
<td><strong>102.0 #</strong></td>
</tr>
</tbody>
</table>

* Source: U.S. Census Bureau, Census 2000 Supplemental Survey

# Persons may report more than one race/ethnicity, therefore total can exceed 100%

private (non-public health) nature of the clinic, or to lack of non-English speaking pediatricians.

When asked if a story on immunization had been seen in the newspaper, or on television in the past week or two, 161 persons indicated they had seen a story of some kind (23.7%), as opposed to 519 persons (76.3%) who could not recall seeing anything in the media on the pretest. When asked the same question on the posttest, 55 persons recalled stories (25%) in the prior 2 weeks, versus 165 (75%) who did not recall seeing a story in the media. The relative stability between these pre and posttest scores suggests that the administration of the pretest did not heighten the awareness of individuals completing it, so as to take greater note of immunization-related media stories during the period of the experiment. It also gave indication that no major local or national stories ran with above average memorability of content on immunization.

Respondents varied in age from 18 to 73, with a median age of 34, comparable to the U.S. Census 2000 Gwinnett County median age of 32.2. This is not to say that all
Gwinnett County residents are immunization caregivers, but that the median age is similar. Forty-three percent of the children presenting for immunizations were under age two (range 2 days to twenty years). A cumulative total of 65.1 percent of children presenting for shots were age five years old, or younger.

Religious affiliation varied widely. Each person surveyed was asked their religious affiliation, rather than picking a selection from a list, thus the categories are not mutually exclusive. Note that some super-categories (e.g. Protestant, Christian) were specified as opposed to a particular denomination. The category “None” captures both persons who chose not to answer the question (it was optional) and persons who did not specify a religion. As there were no respondents from the Amish, Mennonite, or Pennsylvania Dutch congregations, known to be averse to immunization for religious reasons, this particular faith community grouping cannot be discretely compared to others to measure anti-immunization sentiment. Religious affiliation was not broken down at the County level by Kosmin and Lachman (1993), so Table 3 breaks out the totals by self-reported faith, and compares them to state of Georgia totals. Although variation was observed between the numbers of persons reporting Baptist, Catholic, Muslim and other denominations, between Georgia averages and persons attending this clinic, these differences did not seem to have an effect upon parental immunization behaviors.

The posttest concluded with an item to measure direct recall of immunization posters in the clinical setting. Two hundred and seven persons surveyed remembered seeing an immunization-related poster (94.1% of the 220 individuals who returned posttests).
Table 3

*Study Respondent Religion and Georgia Comparison*

<table>
<thead>
<tr>
<th>Religion</th>
<th>Study Frequency</th>
<th>Study Percent</th>
<th>Georgia Totals*</th>
</tr>
</thead>
<tbody>
<tr>
<td>None/Not answered</td>
<td>151</td>
<td>22.2</td>
<td>4.6</td>
</tr>
<tr>
<td>Baptist</td>
<td>132</td>
<td>19.4</td>
<td>50.8</td>
</tr>
<tr>
<td>Catholic</td>
<td>114</td>
<td>16.8</td>
<td>6.3</td>
</tr>
<tr>
<td>Christian</td>
<td>108</td>
<td>15.9</td>
<td>91.1</td>
</tr>
<tr>
<td>Methodist</td>
<td>67</td>
<td>9.9</td>
<td>11.5</td>
</tr>
<tr>
<td>Non-denom</td>
<td>22</td>
<td>3.2</td>
<td>**</td>
</tr>
<tr>
<td>Protestant</td>
<td>18</td>
<td>2.6</td>
<td>7.3</td>
</tr>
<tr>
<td>Muslim/Islam</td>
<td>12</td>
<td>1.8</td>
<td>.3</td>
</tr>
<tr>
<td>Lutheran</td>
<td>10</td>
<td>1.5</td>
<td>.9</td>
</tr>
<tr>
<td>Pentecostal</td>
<td>8</td>
<td>1.2</td>
<td>1.8</td>
</tr>
<tr>
<td>Episcopal</td>
<td>7</td>
<td>1.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Mormon/LDS</td>
<td>7</td>
<td>1.0</td>
<td>.4</td>
</tr>
<tr>
<td>Presbyterian</td>
<td>7</td>
<td>1.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Jewish</td>
<td>6</td>
<td>.9</td>
<td>.5</td>
</tr>
<tr>
<td>J. Witness</td>
<td>4</td>
<td>.6</td>
<td>.9</td>
</tr>
<tr>
<td>Greek Orthodox</td>
<td>2</td>
<td>.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Buddhist</td>
<td>2</td>
<td>.3</td>
<td>.1</td>
</tr>
<tr>
<td>Unitarian</td>
<td>1</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>Hindu</td>
<td>1</td>
<td>.1</td>
<td>.2</td>
</tr>
<tr>
<td>Seventh Day Adventist</td>
<td>1</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>680</strong></td>
<td><strong>99.9%</strong></td>
<td><strong>Non-add</strong></td>
</tr>
</tbody>
</table>


** Kosmin and Lachman (1993) did not capture a Non-denominational category.

The first question on the pretest, that asked about the importance of immunization, was designed to gauge how strongly persons felt about immunization, and were thereby susceptible to attitudinal inoculation. Recall that McGuire (1964) recommended that Inoculation Theory is most appropriately applied when a combined total between Agree and Strongly Agree on a five-point Likert scale was 80 percent or higher; in this experiment, the total was 100% (15.9% Agree and 84.1% Strongly Agree), meeting that recommendation.
The item regarding whether or not caregivers trusted their doctor’s immunization recommendations also generated high levels of agreement, with 92.3% of persons either agreeing or strongly agreeing with that statement. Yet even with such high levels of physician trust and agreement over the importance of immunization, 24.6% of persons surveyed indicated they thought that too many shots could overwhelm or weaken an infant’s immune system, which was consistent with the 25% reported by Gellin, Maibach, and Marcuse (2000).

Memorability of Immunization Messages

Three primary items were designed to test the mean differences in scores, from 1 (Strongly Disagree) to 5 (Strongly Agree), between persons who were exposed to the experimental poster, compared to those who saw the control poster. The messages and associated descriptive statistics are reported in Table 4.

Table 4

<table>
<thead>
<tr>
<th>Three Primary Messages</th>
<th>Condition</th>
<th>Pretest N</th>
<th>Pretest Mean</th>
<th>Pretest Std. Dev.</th>
<th>Posttest N</th>
<th>Posttest Mean</th>
<th>Posttest Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Pain, No Gain.</td>
<td>Experiment</td>
<td>340</td>
<td>4.55</td>
<td>.590</td>
<td>113</td>
<td>4.49</td>
<td>.825</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>340</td>
<td>4.56</td>
<td>.532</td>
<td>107</td>
<td>4.57</td>
<td>.631</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>680</td>
<td></td>
<td></td>
<td>220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Shots? It Takes Lots!</td>
<td>Experiment</td>
<td>340</td>
<td>3.58</td>
<td>.743</td>
<td>113</td>
<td>4.02</td>
<td>.906</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>340</td>
<td>3.53</td>
<td>.762</td>
<td>107</td>
<td>3.50</td>
<td>1.040</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>680</td>
<td></td>
<td></td>
<td>220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sick Today? Shots OK.</td>
<td>Experiment</td>
<td>340</td>
<td>2.93</td>
<td>1.000</td>
<td>113</td>
<td>3.25</td>
<td>1.090</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>340</td>
<td>2.93</td>
<td>.930</td>
<td>107</td>
<td>3.09</td>
<td>1.033</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>680</td>
<td></td>
<td></td>
<td>220</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5 details the analysis of variance (ANOVA) for recall of messages, by specific message.
Table 5

Analysis of Variance for Recall of Immunization Messages

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F value</th>
<th>Sig</th>
<th>Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Pain, No Gain.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Between Groups</td>
<td>.382</td>
<td>1</td>
<td>.382</td>
<td>.703</td>
<td>.403</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>118.454</td>
<td>218</td>
<td>.543</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>118.836</td>
<td>219</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Shots? It Takes Lots!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Between Groups</td>
<td>14.997</td>
<td>1</td>
<td>14.997</td>
<td>15.816**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>206.712</td>
<td>218</td>
<td>.948</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>221.709</td>
<td>219</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sick Today? Shots OK.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Between Groups</td>
<td>1.309</td>
<td>1</td>
<td>1.309</td>
<td>1.159</td>
<td>.283</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>246.127</td>
<td>218</td>
<td>1.129</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>247.436</td>
<td>219</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**p < .01.

Only the very direct language used in the numbers of shots message in the experimental poster (18 shots? It takes lots!) stimulated significant findings by itself of the three discrete messages, (p < .01), as hypothesized. Since the messages were presented as a group, the researcher feels the strong significance of the “18 shots? It takes lots!” message may indicate that attention could have been paid to the other two messages of the poster, even if their memorability did not result in responses indicating findings of statistical significance. Interaction terms were not significant.

Pedhazur (1997) indicates that the eta-squared (\(\eta^2\)) statistic is comparable to the omega square as an indicator of effect size in ANOVA calculations, found “by dividing the sum of squares associated with the component in question by the total sum of squares” (p. 505). An insufficient number of posttests were returned to measure small
effect sizes well (N=220). One would need approximately 400 responses at a minimum to begin to assure statistical stability, and this experiment was designed with 542 responses as its goal), but mirroring the ANOVA results above, the question revolving on numbers of shots gives sufficient indication of an effect. The partial $\eta^2$ for the numbers of shots variable indicated that approximately 7% of the total variation was explained by this message; a small effect. If more persons had returned the posttest, the power would have more closely reflected the original calculation, and perhaps all three dimensions could have received sufficient support to independently describe separate significant effects for each variable in challenging and maintaining the desired attitude.

Three other questions in the instrument were also designed to test the three primary themes of the experimental poster, but they were phrased in the reverse of the primary items, e.g. instead of “Shots may hurt a little bit, but the benefit outweighs the discomfort,” the item read, “I think shots hurt my child more than they are worth.” The item responses were coded in reverse order, to account for the two differing ways of asking the same question, e.g. “My child cannot get shots if he or she is sick” is the reverse of “If my child has a minor illness, it is OK to get his or her baby shots.” Question ten was an elaboration on the number of shots in the schedule, echoing question four, but not posed in the negative. Responses to these questions did not elicit findings of statistical significance under ANOVA testing.

Only one of the three messages resulted in significant support for the hypothesis that an Inoculation Theory based poster generates some specific recall of Inoculation Theory-based items, as compared to a general control on the childhood immunization topic. Importantly, the message that received the strong support on the experimental
poster was on the same theme as the control poster, that is the deterrence that sheer numbers of shots pose to timely completion of the immunization regimen. This suggests that it is possible to inoculate a refutation to a common argument against vaccination, using a theoretical approach over a creative one.

Relationships between Variables

Given the weak performance of two of the three primary variables, a correlation analysis was performed and reported in Table 6, to double-check the perceived relationship between the pairs of items used to measure the three themes from the pretest responses. Correlations were observed, first between the perceived benefits of vaccination and the temporary discomfort of shots, (No Pain, No Gain.), second between the dozen shots in the schedule and more and more needed (18 Shots? It Takes lots!), and third between minor illness and shot readiness (Sick Today? Shots OK). These results were expected, as the question pairs were designed to elicit similar responses along the three tested themes of the posters.

The variable of ethnicity showed a number of interesting relationships with posttest items. Crosstabulations run between ethnicity and importance of immunization, the benefit of immunization, trust of doctor, and understanding of the small risks of immunization are detailed below. Virtually all posttest respondents again agreed or strongly agreed with the item on the importance of immunization, regardless of ethnicity (97.6%). Crosstabulation of the second item, however, suggests the presence of ethnic differences between respondents on this key item, reported in Table 7.
Table 6

*Pearson Correlations Between Key Message Components*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Benefit Outweighs Discomfort</td>
<td>--</td>
<td>.444**</td>
<td>.150*</td>
<td>.026</td>
<td>.134*</td>
<td>.134*</td>
</tr>
<tr>
<td>2. Hurt More than Worth</td>
<td>--</td>
<td>.000</td>
<td>-.076</td>
<td>.154*</td>
<td>.161*</td>
<td></td>
</tr>
<tr>
<td>3. Over a dozen shots now</td>
<td>--</td>
<td>.406**</td>
<td>.175**</td>
<td>.208**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. More shots being added</td>
<td>--</td>
<td>.081</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. OK to get shots with minor illness</td>
<td>--</td>
<td></td>
<td>.630**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. No shots if sick</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05. **p < .01.

Table 7

*Crosstabulation Between Ethnicity and Benefit of Immunization*

<table>
<thead>
<tr>
<th>Benefits Outweigh the Risks of Immunization</th>
<th>Scale/Ethnicity</th>
<th>African American</th>
<th>Hispanic</th>
<th>White, non-Asian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>10</td>
<td>2</td>
<td>58</td>
<td>5</td>
<td>75</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>6</td>
<td>7</td>
<td>120</td>
<td>2</td>
<td>135</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>21</td>
<td>9</td>
<td>183</td>
<td>7</td>
<td>220</td>
</tr>
</tbody>
</table>

Twenty-four percent of African-Americans were either unsure of the benefit of immunization, or strongly disagreed with the statement, compared to only three percent of White, non-Hispanics. Interestingly also, none of the Asian or Hispanic respondents indicated unsure or a level of disagreement with the concept of the benefit of
immunization outweighing the temporary discomfort of the shot. Table 7 and Table 8 show the small number of responses on this issue, so it is important to note that the meaning of these findings should not be overextended. Even so, the high African-American score could be due to mistrust of immunization as a procedure or mistrust of doctors, as the subsequent crosstabulation shows that 11% of African-Americans strongly distrust their doctor’s shot recommendations, compared to less than 1% of Whites. Again, the Hispanic and Asian respondents trust their doctor’s recommendations without a negative response. These findings are reported in Table 8.

Table 8

<table>
<thead>
<tr>
<th>Trust of Doctor</th>
<th>Scale/Ethnicity</th>
<th>African American</th>
<th>Hispanic</th>
<th>White, non-Hispanic</th>
<th>Asian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>15</td>
<td>5</td>
<td>80</td>
<td>5</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>4</td>
<td>4</td>
<td>95</td>
<td>2</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>9</td>
<td>183</td>
<td>7</td>
<td>220</td>
<td></td>
</tr>
</tbody>
</table>

The cultural importance of this finding points out that communications suggesting a trusting doctor/patient relationship as a basis for immunization decision making need to be ethnically tailored and sensitive in order to influence different audiences.

The disparity between ethnic group’s understanding that there are small risks to getting immunized is particularly noteworthy, and is reported in Table 9.

Thirty-three percent of African-Americans were Unsure or Disagreed (at some level) on this question, suggesting a lack of understanding of immunization risks. Compare this to 22% of Hispanic respondents, 14% of Asian respondents, and 7% of
Crosstabulation Between Ethnicity and Understanding of Immunization Risks

<table>
<thead>
<tr>
<th>Understanding of Small Risks of Immunization</th>
<th>Scale/Ethnicity</th>
<th>African American</th>
<th>Hispanic</th>
<th>White, non-Asian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td>4</td>
<td>1</td>
<td>12</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>Agree</td>
<td>14</td>
<td>5</td>
<td>111</td>
<td>5</td>
<td>135</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>2</td>
<td>59</td>
<td>1</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>9</strong></td>
<td><strong>183</strong></td>
<td><strong>7</strong></td>
<td><strong>220</strong></td>
</tr>
</tbody>
</table>

White respondents and a serious education opportunity is revealed. If a third of African-Americans and a fifth of Hispanics either do not trust their doctor’s immunization recommendations, do not understand the benefits of immunization, or think there are no risks to immunization, then the culture of mistrust and misinformation may be utterly impermeable to health education efforts using pro-immunization posters. An entirely different approach may be called for, which does not use risk/benefit, and other cognitive types of influencers as a means of attitude and eventually behavior modification. On the other hand, the White audience responds as predicted to these influencers, suggesting again that ethnically tailored approaches to immunization communications are strongly warranted, and may take very different forms to stimulate the desired attitudes and behaviors. Of note, the same two African American persons responded “Strongly Disagree” on all three of the items presented in Tables 7, 8, and 9. It is possible that those two individuals held distinctly anti-immunization sentiments, and their consistent responses could skew the data (and conclusions based upon it) on the issue of minority doctor distrust, as well as understanding of risk and benefit of immunization. Future research should seek to clarify these issues.
The only correlation between a posttest item and gender of the respondent resulting in statistical significance was on the question, “If my child has a minor illness, it is OK to get his or her baby shots.” The Pearson coefficient was $r = -0.179$, ($p < 0.01$), meaning that men and women view, and perhaps act on this issue differently. A crosstabulation run on the two variables shows that equal numbers of women agree ($n=58$), are unsure ($n=56$), and disagree ($n=59$) with that topic, but almost all men agreed with the item ($n=11$), with only two who disagreed. The cultural significance of this finding would be an interesting subject for follow-up, as most men in this study replied they were ready to vaccinate despite minor illness, whereas women were divided on this topic. This was one of the important three concepts tested in the inoculation-based materials, as minor illness is not a valid contraindication for vaccination (Atkinson et al, 1999). Whether this response in men was a result of knowledge and understanding of this principle of vaccination, or a measure of risk-taking or another construct is not known, but the negative correlation was statistically significant.

No strong relationships were observed between religion and posttest measures, but parent age correlated significantly with worries about vaccine safety, understanding of the risks of immunization, and anxiety that too many shots could overwhelm or weaken an infant's immune system. The correlations are reported in Table 10.

To look at the crosstabulations associated with these correlations, the prior established median age of 34 for respondents is used as an attitudinal midpoint, and the response of unsure will not support either the agree or disagree response. Less than half of the younger group indicated worries about vaccine safety ($n=46$ of 102) whereas more than half of the older group agreed that they worry about vaccine safety ($n=56$ of 102).
Table 10

*Pearson Correlations Between Parent Age and Anxiety Measures*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parent age</td>
<td>--</td>
<td>.140*</td>
<td>.173**</td>
<td>.224**</td>
</tr>
<tr>
<td>2. Vaccine safety worries</td>
<td>--</td>
<td>--</td>
<td>-.068</td>
<td>.425**</td>
</tr>
<tr>
<td>3. Risks of immunization</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-.195**</td>
</tr>
<tr>
<td>4. Anxiety over too many shots</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01.

This result suggests that worries about vaccine safety increase slightly with age. Of greater concern is the fact that half of all respondents are worried about vaccine safety, in an era of unprecedented quality control of vaccines! The vast majority of the entire age spectrum understood that there were small risks to immunization as well, but the younger group disagreed with the idea of multiple shots overwhelming an infant’s immune system at a rate of approximately 3:1, whereas the older group disagreed at a rate of greater than 7:1. This result could be due to a number of factors, but this finding tends to suggest that as a person ages, anxiety diminishes over one’s child receiving multiple vaccines, whether due to previous vaccine successes with prior children, or greater understanding of rarity of vaccine failure or fault.

The final correlation analysis was between group and the three primary experimental values. As revealed in the prior analysis of variance, the only significant relationship was between the posttest scores on the variable about the number of shots in the series and experimental group $r = -.26$, ($p < .05$). The other two variables of interest
did not reach a significant level by themselves, but as a group, the correlation was significant \( r = .159, (p<.05) \), meaning perhaps that a cluster of pro immunization messages support parental feelings about immunization when questions are resolved or answered, compared to a message where the resolution is implied, but not explicitly stated. Seventy-six percent of the experimental group agreed with the statement that there were over a dozen shots in the childhood immunization schedule, compared to 47% in the control group. The difference between those who were unsure was also disparate: 19% were unsure in the experimental group of that statement, compared to 37% in the control group.

**Media Effects**

Pretest and posttest measures on the effects of a recent media story on attitudes were taken, to explore correspondence cited in the literature between the effects of a highly publicized, and usually negative story about immunization and resultant impact on immunization attitudes. The question, “I have seen a story on TV or in the newspaper in the last week or two that mentions immunization” was measured as a dichotomy.

Frequently persons volunteered anecdotal references to smallpox vaccination in the news, as a result of bioterrorism precautions undertaken by the United States government, but this issue is not a subject of this study, nor is smallpox vaccine currently indicated for use in children. A total of 161 of 680 takers of the pretest (23.7%) indicated they had seen something in the news about immunization. Fifty-three of the 220 posttest respondents (24.0%) indicated they had seen something in the news in the last week or two about immunization. The timing of the mailings, orchestrated to maximize the inoculation effect, was also mindful that the earliest a recipient could receive the posttest in the mail
would allow this question to measure the interval after the pretest had been taken, and not overlap it, temporally. The extreme stability of this measure, and lack of particular stories as independently reviewed by the researcher suggests that the window during which this study occurred did not contain a sensational vaccine preventable disease-related media story that could have precipitated an independent media-related effect upon parental attitudes in favor of, or in opposition to vaccination, in posttest responses.
Principle Hypothesis and Research Question

The principle hypothesis of this experiment was: Parental attitudes toward and recall of immunization messages about a child’s pain, number of shots, or ability of the child to receive shots while ill will be stronger after passive exposure to an Inoculation Theory-based message than those stimulated by passive exposure to a creative, but non-theoretically derived message. The hypothesis received support from this experiment, more strongly in the dimension about number of shots than in area of momentary child pain, or the area of proper contraindications for vaccination during sick or well child status. A more robust experiment is called for, with greater power, more directly worded measurement statements, and more items to measure each question of interest.

Persons who took part in this experiment varied by 56 years in age, and differences in understanding about immunization issues along the age spectrum suggest that different approaches for inexperienced and older parents, caregivers and grandparents may need to be proposed, and tested separately. Half of all persons worried to some degree about vaccine safety, a fact that should concern manufacturers and promoters of vaccines. One quarter of persons were anxious that too many shots could overwhelm or weaken an infant’s immune system, a troublingly high number for policymakers with an already large immunization schedule to promote.
If a similar study could be conducted with a higher number of returned posttests, perhaps it might show if this support would increase, or if not, give rise to a search for other theories that might elicit stronger response in future inquiry. Prislin suggested almost a dozen topics that proved to be barriers, either real or perceived to timely infant immunization. Each one should be tested for utility in an Inoculation Theory-based approach to immunization message delivery.

Although this study documented reading level of materials, no attempt was made to gauge the ability of respondents to actually understand the materials. To extend the reach of this type of intervention, this poster also would require translation into other languages, and could take other forms with low literacy audiences in mind, if it was to be used widely. Platforms using humor, empowerment, or other frames of reference (doctor to grandparent; nurse to father) should also be explored in an Inoculation-based context.

Crosstabulation showed relationships between ethnicity and the three variables of trust of doctor, perceived benefits of shots, and misunderstanding of the small risks of immunization. Consideration of these issues in practice suggests that patient education on immunization should be tailored, with additional time programmed during patient visits for explanation of risk and benefit of vaccination and trust building between doctors and African American and Hispanic parents being warranted. Additional study into gender differences around vaccine acceptability, especially during sick visits, is also needed.

Positive attitudes about immunization, although a social norm in this day, are always changing. The bio-technology that allows us to prevent diseases is continually improving, with more research, vaccines will be safer, cause fewer side effects, and will dwindle in number, as ways are discovered to combine antigens into fewer injections.
Sensational news on vaccine failure will also propagate more widely and rapidly, as media networks bring news instantaneously to large audiences at many levels; often with little context or worse, with a desire to provoke or inflame controversy. Medically accurate information and messages that promote healthy behavior will remain at a premium, but will be increasingly available outside of the direct doctor/patient interaction. The Internet, as source of information, roundtable for discussion, sensational news purveyor, entertainment director, and other yet to be articulated roles will increasingly prefigure into immunization decision-making. Yet even so, persons will still travel to and wait in doctor’s offices and health departments to receive shots. The use of this particular period of waiting preys upon the agitated caregiver’s elevated information-seeking behavior. He or she is there to find out what is wrong, or to ward off illness through protection-seeking behavior. The opportunity to exert subtle influence, via the immediate environment should not be underestimated, or wasted.

Limitations of Study

One limitation of this study was in the dissimilarity of wording between the inoculation messages and the questions used to test their understandings, as shown in Table 11.

At the basic level, Inoculation Theory posits a simple truth, then refutes or maintains it with a direct statement or argument. High credibility sources, distraction during learning, and environmental cues are factors in the success of the formula, and the desired end is the sustained understanding of the argument and its refutation, accepted in attitude, and maintained in behavior.
Table 11

*Comparison of Study Phrase Items and Study Measures*

<table>
<thead>
<tr>
<th>1. No Pain, No Gain.</th>
<th>A. Shots may hurt a little bit, but the benefit outweighs the discomfort.</th>
<th>B. I think shots hurt my child more than they are worth.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. 18 shots? It takes lots!</td>
<td>A. There are now over a dozen shots in the childhood immunization schedule.</td>
<td>B. More and more shots are being added to the childhood immunization schedule.</td>
</tr>
<tr>
<td>3. Sick Today? Shots OK.</td>
<td>A. If my child has a minor illness, it is OK to get his or her baby shots.</td>
<td>B. My child cannot get shots if he or she is sick.</td>
</tr>
</tbody>
</table>

In the case of the first statement, it reads in the negative, and attempts to apply a commonplace truism to childhood immunization. The questions that test it, however, are not focused upon the pain and the gain, rather they use the words benefit and discomfort, hurt and worth. In Question 1.A., they are in the opposite order from the inoculatory phrase; pain and discomfort are not necessarily perceived in the same way and gain and benefit are also somewhat philologically different. Hurt and worth in Question 1.B. are more closely aligned in order and in meaning, but a subject has to disagree with the statement in order to agree with the phrase! These two questions may not have precisely gauged the subject’s memory of the phrase or even related the response to it, on the
posttest. This discord could partially explain the failure to find significance in the ANOVA around these questions, by group.

In the findings of strongest significance, there was a high concordance between the phrase on the poster “18 shots? It takes lots!” and the two questions that measured recall of it. In Question 2.A., the question indicates a specific number, which seems high at face value, and reinforces it with an even higher number and a confirmatory, exclamatory remark in the inoculation. Question 2.B., is weaker, potentially misleading inferences that shots escalate in number and frequency continually, rather than pointing to a particular, contemporary threshold number (18).

The third question, although failing to find statistically significant difference from the control, is the strongest inoculatory phrase, that plays on a common misperception associated with childhood vaccination-decision making. There are few, valid medical contraindications to vaccinating a sick child, but parents typically deny offered vaccines when their child is visiting the doctor due to illness. Every time a child visits a medical facility represents an opportunity to vaccinate (and to educate, for that matter), and to miss such an opportunity for a medically invalid reason means that there are rips in the safety net that protects from VPDs. This phrase also takes advantage of known influencers within Inoculation Theory that bolster message uptake. Source credibility is high, since this poster is viewed in a doctor’s office; a retreat for medical advice and counsel. Distraction, a useful element in forcing focused attention to a message, and thereby increasing its memorability, is also high since waiting and exam rooms are often busy, noisy places where extra effort is needed to pay attention to health messages. The very environment is controlled in access, payment, patient movement, and flow of
resources, making it ideal to instill new ideas, refute incorrect notions, and sustain correct attitudes and behaviors around health issues. Both Questions 3.A., and 3.B., directly measure understanding of the relationship between ill health status and acceptability of vaccines, but may have fallen short for several reasons. First, the term “OK” may be ambiguous, perhaps meaning assent, but not the enthusiasm needed to contravene the “accepted wisdom” of not getting shots for sick kids. The second question may have reinforced negative opinions about immunization acceptability during illness, rather than harkening to what was shown on a waiting room wall about baby shots while ill. If a child had a life-threatening illness then this statement could be incorrect, as decided by the doctor, invalidating it, despite the other conditions where it is acceptable and true. Finally, there may have been some confusion about what kind of shots were ok, such as influenza shots administered at the onset of illness to prevent that particular illness, as opposed to getting a measles shot, while there for a runny nose. These nuances show that even straightforward inoculations and refutations may run into “real world” snags when applied.

Inoculation Theory, unlike other social/behavioral theories, does not have tested constructs and validated subscales to guide research and analysis. The researcher chose the constructs to be studied from a literature review of the topic spanning five decades, with a sprinkling of applications. Although tested by manipulation check herein, immunization has never been the subject of an Inoculation Theory driven dissertation or research project, and therefore the statements tested in this study are based on immunization literature, not Inoculation Theory-based work. This limitation could greatly
impact the generalizability of this study, or weaken its predictive value until other studies are done using similar methods, and with similar audiences on this topic.

This study was designed to tease out the impact of a negative story in the media about immunization during the conduct of the study. Although it was hardly bad news that no such news occurred, the elaborate preparations to study the concept of within-person variance, where a subject turns 180 degrees from an espoused position due to the effects of an intervention or a media story, was unable to be tested. This concept was only found in a single Inoculation study (Easley, Bearden, & Teel, 1995), but it was provocative in concept, thus the preparations. A longer duration of study could be reasonably certain of containing such an event, and this methodology might be a fine enough filter to capture such information.

The pretest/posttest design is a snapshot of a person’s attitudes before and after an experimentally controlled intervention occurs. Inoculation Theory has been noted in the literature to induce lasting effects, but notes that they wane over time if not boosted. A limitation of the current study is that is did not include a mechanism to send post-posttests to participants to test the duration of the inoculation effects, or to look at trends in behavior (like in a repeated measures design). Also absent is the outcome evaluation; where a participant’s immunization record could be examined and compared between groups to see if immunizations were given at correct intervals and when the child presented for a sick care visit. This evaluation could also serve the dual purpose of checking the doctors to see if immunizations were offered at the correct time and under most conditions; an element of the study that the researcher was not allowed to observe.
Another fundamental limitation of this study was in the small effect size measured by the sample, and reduced power (closer to .70 than .80 for 220 participants, according to Keppel), due to too few folks returning the post test. The study was capable of finding a small effect ($\eta^2 = .068$) for the primary message, but this is not a robust enough to warrant a national rollout of pro immunization posters based upon Inoculation Theory. Recall that the posters were exactly alike in size, typeface, and graphics, and only differed in the primary messages. Further study is warranted with a refined instrument, a longer set of questions, and use of different variables and messages.

Implications of Intervention: Program and Policy

Vaccine preventable diseases are on the wane in America. They continue to be imported through migration of persons across geopolitical boundaries, but are becoming less endemic in this country. A key economic principle in public health is that costs increase to prevent disease as incidence declines. Resources directed toward disease elimination today save expenditures later, at tomorrow’s higher costs. If immunization rates are at historic highs, with conventional, but atheoretical health promotion methods, then perhaps small effects are indeed useful in the march toward 100% immunization rates and the concomitant disease elimination, especially if garnered at marginal expenditure. Publication of the process of the intervention, development of case studies and documentation of failure will ultimately contribute more to the appropriate use of the best theories into effective health promotion practices than the current “Madison Avenue” creative approach. This contention is not to say that creativity and good ideas need be sacrificed on the altar of theory, but when fused in a planned process, the outcome is more defensibly related to the inputs, than to chance or good fortune alone.
Immunization communications policy that coalesces around a theory-driven research agenda will advance program goals and mission in a strategic manner. Even if Inoculation Theory does not ultimately prove to be the best fit for promoting childhood immunization, one result from this study suggests that it works better than creative approaches alone on some dimensions. This result suggests, in turn, that it is possible to motivate better retention of information; important information that has been shown to influence immunization decision-making. With vaccines for Human Immunodeficiency Virus (HIV) and other diseases on the horizon, applications of theory to health communications within the topic of immunization will continue to be presented. The ultimate outcome measure is disease elimination, and communications would only be a single star in a public health constellation of efforts to achieve this goal.

The policy implications of Inoculation Theory inclusion into immunization promotion have retrospective and prospective considerations. In retrospect, CDC should consider modifying the Health Communications Wheel, the foundation of its communications policy, to include description and inclusion of theory into all communications planning and execution functions. The profusion of communications theories could then be harnessed to the variety of health topics CDC promotes, and achieve the approbation of SOPHE and other professional entities whose charters espouse use of theory in intervention planning. A systematic review of theory utility and appropriateness could evolve into a sort of schedule of theory testing, development, application, and transformation. CDC excels at applied health communications, which (after adding theory development to the mix) could enrich the literature of health promotion, and begin to address future ethical dilemmas that such promotion will
ultimately beget. Ethical study into health communications effects upon human behavior should be called to account for the most appropriate use of theory to foster fully empowered health decision-making.

Prospectively, the process of theory selection and testing should be considered as important as the literature review in health communications planning. Best practices should focus on refining theories, applying them to interventions, and documenting them as case studies; taking theory from the classroom to the doctor’s office and back again. Documentation of interventions should be tested independently among differing types of health care delivery setting, and advocacy to continue those practices which show results should be presented to those who fund such programs to ensure their continued success. Sustained attention to the SOPHE developed code of ethics in public health practice will also assure that the dignity and respect of the parents and children who accept immunizations are protected. Eventually, this sustained and augmented programming will result in the retreat of childhood vaccine preventable diseases from the human scene.

But, information itself, however rendered, is not a vaccine. Attitudes, intentions, behaviors, and the experimental manipulation of conditions that exert influence are all subject to application, interpretation, realization, and other processes that are sometimes cognitive and rational, and other times impulsive and emotional. Public health is a social good, and fosters private health, but cannot perfectly impose it in a free society, especially one that is information rich, and individualistic. Inoculation Theory can be a useful tool in immunization promotion, but even the most appropriately derived and deployed messages have to be delivered in a supportive environment. Those who speak out against vaccination, regardless of their reasons, will find ways to amplify their voice
and attract their adherents. This type of advocacy is to be expected, in communications planning. The role of public health has been to steadily progress toward elimination of vaccine preventable diseases, but if in so doing, it improves communications between people and empowers and equalizes opportunities for persons who, a century ago, might not have lived to adulthood, then it has done far more than add quantity to life expectancy; it has added quality. And *that* may actually be public health’s greatest achievement of the 20th century.
REFERENCES


APPENDIX A

UGA IRB FORM
# APPROVAL FORM

**Date Proposal Received:** 2002-05-30  
**Project Number:** H2002-10890-0

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Dept/Phone</th>
<th>Address</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOHN P ANDERTON</td>
<td>MI</td>
<td>Health Promotion &amp; Behavior</td>
<td>1021 EAGLES RIDGE COURT</td>
<td>LAWRENCEVILLE GA 30043 (404) 639-8934</td>
</tr>
<tr>
<td>Dr. Mark G. Wilson</td>
<td>CO</td>
<td>Health Promotion &amp; Behavior</td>
<td>Ramsey Center +6522</td>
<td>542-4364</td>
</tr>
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**Title of Study:** Inoculation Theory and Immunization Promotion

<table>
<thead>
<tr>
<th>45 CFR 46 Category: Administrative 2</th>
<th>Modifications Required for Approval and Date Completed: 2002-06-17</th>
<th>Application, consent form and authorization</th>
</tr>
</thead>
</table>

**Approved:** 2002-06-17  
**Begin date:** 2002-06-17  
**Expiration date:** 2002-12-16

*NOTE: Any research conducted before the approval date or after the end date is not covered by IRB approval and cannot be retroactively approved.*

**Number Assigned by Sponsored Programs:**  
**Funding Agency:**

**Form 310 Provided:** No

Your human subjects study has been approved as indicated under IRB action above.

Please be aware that it is your responsibility to inform the IRB:

...of any adverse events or unanticipated risks to the subjects or others within 24 to 72 hours;

...of any significant changes or additions to your study and obtain approval of them before they are put into effect;

...that you need to extend the approval period beyond the expiration date shown above;

...that you have completed your data collection as approved, within the approval period shown above, so that your file may be closed.

For additional information regarding your responsibilities as an investigator refer to the IRB Guidelines.

For your convenience in obtaining approval of changes, extending the approval period, or closing your file, we are providing you a blue Researcher Request form. Detach this blue form, complete it as appropriate, sign and date it, then return it to the IRB office. Keep this original approval form for your records.

**Copy:**  
Dr. Stuart W. Fors

---

*Christina A. Joseph, Ph.D.*  
Chairperson, Institutional Review Board
APPENDIX B

CONSENT FORM
Inoculation Theory and Immunization Promotion

I am interested in your attitudes and opinions about immunization. Immunization rates are not as high as they could be in the United States, and I would like to know why, thus my conduct of this research. You may learn more about immunization than you currently know, and can call 1-800-232-2522 (a toll-free number) if you would like to ask questions to learn more.

I will be asking you to fill out a questionnaire now, and will send you a second questionnaire by mail in about two weeks. No stress, discomforts, or risks are foreseen. Any information I obtain about you as a participant in this study, including your identity will be held confidential. Your identity will be coded, and all data will be kept in a secured, limited access location. Your identity will not be revealed in any publication of the results of this research.

Your thoughts are important, so please be candid. In order to maintain proper research standards of ethics, this consent form must be read, signed if you agree to participate, and returned to me. A copy for you to keep is also attached. I will answer any further questions about the research, now or during the course of the project, and can be reached at 770/995-5723.

I agree to participate in the research titled “Inoculation Theory and Immunization Promotion,” which is being conducted by John Anderton, of the Department of Health Promotion and Behavior at the University of Georgia (770/995-5723) under the direction of Dr. Mark Wilson, (706/542-3313). I understand that this participation is entirely voluntary; I can withdraw my consent at any time without penalty and have the results of the participation, to the extent that it can be identified as mine, returned to me, removed from the research records, or destroyed.

Please sign both copies of this form. Keep one and return the other to the investigator.

Signature of Researcher Date Signature of Participant Date

Research at the University of Georgia that involves human participants is overseen by the Institutional Review Board. Questions or problems regarding your rights as a participant should be addressed to Julia D. Alexander, M.A., Institutional Review Board, Office of the Vice President for Research, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-6514; Email Address IRB@uga.edu.
APPENDIX C

POSTCARD REMINDER
Two weeks ago you visited Children’s Medicine for a well child visit, and completed a survey about immunization. A second survey was sent to you in the mail, and we have not yet received your reply.

Please take a moment to fill it out and return it in the postage paid envelope; the results will give us important information about childhood immunization.

Unless you requested additional information, we will not send you other reminders. If you have any questions, please call John Anderton at 770/995-5723. Thank you!
APPENDIX D

MANIPULATION CHECK
After looking at the two immunization posters, please answer the following questions:

TRUE  FALSE

☐ ☐ The two posters are the same.

☐ ☐ There are many reasons to get a child shots on time.

☐ ☐ Shots may hurt a little bit, but the benefit outweighs the discomfort.

☐ ☐ The picture of the child is memorable.

☐ ☐ There are over a dozen shots in the childhood immunization schedule now.

☐ ☐ If my child has a minor illness, it is OK to get his or her baby shots.

I understand what the point of the message is:
Poster One: _____________________________________________
Poster Two: _____________________________________________

My gender: ☐ Male ☐ Female
My ethnicity: ☐ African-American ☐ Hispanic
☐ White, non-Hispanic ☐ Asian
Other: ________________________________

My age: _________  My child’s age: _________

My religion (optional): ________________________________

Other comments: ________________________________  Thank you for your help today!
APPENDIX E

DEBRIEFER
The Importance of Childhood Immunizations

Disease prevention is the key to public health. It is always better to prevent a disease than to treat it. Vaccines prevent disease in the people who receive them and protect those who come into contact with unvaccinated individuals. Vaccines help prevent infectious diseases and save lives. Vaccines are responsible for the control of many infectious diseases that were once common in this country, including polio, measles, diphtheria, pertussis (whooping cough), rubella (German measles), mumps, tetanus, and Haemophilus influenzae type b (Hib).

Parents are constantly concerned about the health and safety of their children and take many steps to protect them. These steps range from child-proof door latches to child safety seats. In the same way, vaccines work to protect infants, children, and adults from illnesses and death caused by infectious diseases. While the US currently has record, or near record, low cases of vaccine-preventable diseases, the viruses and bacteria that cause them still exist. Even diseases that have been eliminated in this country, such as polio, are only a plane ride away. Polio, and other infectious diseases, can be passed on to people who are not protected by vaccines.

Vaccine-preventable diseases have a costly impact, resulting in doctor’s visits, hospitalizations, and premature deaths. Sick children can also cause parents to lose time from work.

Why Are Childhood Vaccines So Important?

- It’s true that newborn babies are immune to many diseases because they have antibodies they got from their mothers. However, the duration of this immunity may last only a to about a year. Further, young children do not have maternal immunity against some vaccine-preventable diseases, such as whooping cough.
- If a child is not vaccinated and is exposed to a disease germ, the child’s body may not be strong enough to fight the disease. Before vaccines, many children died from diseases that vaccines now prevent, such as whooping cough, measles, and polio. Those same germs exist today, but babies are now protected by vaccines, so we do not see these diseases as often.
- Immunizing individual children also helps to protect the
health of our community, especially those people who are not immunized. People who are not immunized include those who are too young to be vaccinated (e.g., children less than a year old cannot receive the measles vaccine but can be infected by the measles virus), those who cannot be vaccinated for medical reasons (e.g., children with leukemia), and those who cannot make an adequate response to vaccination. Also protected, therefore, are people who received a vaccine, but who have not developed immunity. In addition, people who are sick will be less likely to be exposed to disease germs that can be passed around by unvaccinated children. Immunization also slows down or stops disease outbreaks.

You participated in a small survey entitled “Inoculation Theory and Immunization Promotion.” It was designed to test if a poster about immunization, present in the medical examination room, would influence your opinions and attitudes toward childhood immunization. Part One of this survey was given to you in the waiting room, Part Two was sent to your home. The second part inferred that a negative story on immunization aired recently, and asked if that changed your feelings about immunization. As this information sheet indicates, childhood immunization is one of the safest and most effective medical interventions known, and is endorsed by your doctor at Children’s Medicine, and by the Centers for Disease Control and Prevention, a public health agency of the U.S. government. If you have any questions about childhood immunization, ask your doctor or nurse, or call (toll free) 1-800-232-2522.

Thank you for your participation in this survey!
APPENDIX F

CHILDHOOD IMMUNIZATION SCHEDULE, 2002
### Recommended Childhood Immunization Schedule

**United States, 2002**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Age</th>
<th>1 mos</th>
<th>2 mos</th>
<th>4 mos</th>
<th>6 mos</th>
<th>12 mos</th>
<th>15 mos</th>
<th>18 mos</th>
<th>24 mos</th>
<th>4-6 yrs</th>
<th>11-12 yrs</th>
<th>13-18 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hepatitis B</strong></td>
<td>Birth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hep B1</td>
<td>Hep B2</td>
<td></td>
<td></td>
<td></td>
<td>Hep B3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diphtheria, Tetanus, Pertussis</strong></td>
<td>DTaP</td>
<td></td>
<td>DTaP</td>
<td></td>
<td>DTaP</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Haemophilus influenzae Type b</strong></td>
<td>Hib</td>
<td></td>
<td>Hib</td>
<td></td>
<td>Hib</td>
<td></td>
<td></td>
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<tr>
<td><strong>Inactivated Polio</strong></td>
<td>IPV</td>
<td></td>
<td>IPV</td>
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<td>IPV</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measles, Mumps, Rubella</strong></td>
<td>MMR</td>
<td></td>
<td>MMR</td>
<td></td>
<td>MMR</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Varicella</strong></td>
<td>Varicella</td>
<td>PCV</td>
<td>PCV</td>
<td></td>
<td>PCV</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Pneumococcal</strong></td>
<td>PCV</td>
<td></td>
<td>PCV</td>
<td></td>
<td>PCV</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hepatitis A</strong></td>
<td>Hep A1</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Influenza</strong></td>
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</tr>
</tbody>
</table>

**Vaccines below this line are for certain populations:**

- Hepatitis B
- Influenza
- Hepatitis A
- MMR
- PCV

This schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines, as of December 1, 2001, for children through age 18 years. Any dose not given at the recommended age should be given at any subsequent visit (after indicated) and feasible. **S** indicates age groups that warrant special effort to administer those vaccines not previously given. Additional vaccines may be licensed and recommended during the year. Licensed combination vaccines may be used wherever any components of the combination are indicated and the vaccine’s other components are not contraindicated. Providers should consult the manufacturer’s package inserts for detailed recommendations.

1. **Hepatitis B vaccine (Hep B).** All infants should receive the first dose of hepatitis B vaccine soon after birth and before hospital discharge; the first dose may also be given by age 2 months if the infant’s mother is HBsAg-negative. Only monoclonal hepatitis B vaccine can be used for the birth dose. 

2. **Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP).** The fourth dose of DTaP may be administered as early as age 12 months, provided 6 months have elapsed since the third dose and the child is unlikely to return at age 15-18 months. Tetanus and diphtheria toxoids (Td) is recommended at age 11-12 years if at least 5 years have elapsed since the last dose of tetanus and diphtheria toxoid-containing vaccine. Subsequent routine Td boosters are recommended every 10 years.

3. **Haemophilus influenzae type b (Hib) conjugate vaccine.** Three Hib conjugate vaccines are licensed for infant use: PRP-OMP (PedvaxHib® or Comvax® [Menitix]). PRP-OMP is administered at ages 2 and 4 months, a dose at age 6 months is not required. DTaP/Hib combination products should not be used for primary immunization in infants at age 2, 4 or 6 months, but can be used as boosters following any Hib vaccine.

4. **Inactivated poliovirus vaccine (IPV).** An IPV schedule is recommended for routine childhood poliovirus vaccination in the United States. All children should receive four doses of IPV at age 2 months, 4 months, 6-18 months, and 4-6 years.

5. **Measles, mumps, and rubella vaccine (MMR).** The second dose of MMR is recommended routinely at age 4-6 years but may be administered during any visit (provided at least 4 weeks have elapsed since the first dose and that both doses are administered beginning at or after age 12 months). Those who have not previously received the second dose should complete the schedule by the visit at age 11-12 years.

6. **Varicella vaccine.** Varicella vaccine is recommended at any visit at or after age 12 months for susceptible children (i.e., those who lack a reliable history of chickenpox). Susceptible persons aged 13-18 years should receive two doses, given at least 4 weeks apart.

7. **Pneumococcal vaccine.** The heptavalent pneumococcal conjugate vaccine (PCV) is recommended for all children aged 2-23 months and for certain children aged 24-59 months. Pneumococcal polysaccharide vaccine (PPV) is recommended in addition to PCV for certain high-risk groups. See MMWR 2006;55(RR-9):1-37.

8. **Hepatitis A vaccine.** Hepatitis A vaccine is recommended for use in selected states and regions, and for certain high-risk groups, consult your local public health authority. See MMWR 1999;49(RR-12):1-37.

9. **Influenza vaccine.** Influenza vaccine is recommended annually for children 6 months and older. Children aged ≤2 years should receive inactivated vaccine in a dosage appropriate for their age (0.25 mL if age 6-23 months or 0.5 mL if age ≥2 years). Children aged ≥6 years who are receiving influenza vaccine for the first time should receive two doses separated by at least 4 weeks.

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For additional information about vaccines, vaccine supply, and contraindications for immunization, please visit the National Immunization Program Website at [www.cdc.gov/nip](http://www.cdc.gov/nip) or call the National Immunization Hotline at 800-232-2522 (English) or 800-232-6233 (Spanish).

Approved by the Advisory Committee on Immunization Practices ([www.cdc.gov/nip/acip](http://www.cdc.gov/nip/acip)), the American Academy of Pediatrics ([www.aap.org](http://www.aap.org)), and the American Academy of Family Physicians ([www.aafp.org](http://www.aafp.org)).
APPENDIX G

POSTER 1 (EXPERIMENTAL POSTER)
Baby Shot Time?
No Pain, No Gain.
18 shots? It takes lots!
Sick Today? Shots OK.

Call 1-800-232-2522
APPENDIX H

POSTER 2 (CONTROL POSTER)
We Can Think Of 9 Good Reasons To Immunize On Time.

Measles
Mumps
Diphtheria
Tetanus
Hepatitis B
Rubella
Spinal Meningitis
Pertussis
Polio

But You Only Need One.

Your baby’s good health is the best reason to immunize early and on time. Full protection takes around 5 visits for shots starting by age 2 months and ending by age 2. So, ask about your baby’s initial schedule on every visit to your doctor, or, if you don’t have a doctor call the number below to find out where to get your baby’s shots. There’s no good reason to delay. Do it now.

Call 1-800-232-2522

APPENDIX I

PRETEST
Circle the number which matches your attitude ⇒

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Unsure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Immunization is an important issue.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>2. I worry about the safety of the vaccines given to my kids.</td>
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<td>3. Shots may hurt a little bit, but the benefit outweighs the discomfort.</td>
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<tr>
<td>4. There are now over a dozen shots in the childhood immunization schedule.</td>
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<tr>
<td>5. If my child has a minor illness, it is OK to get his or her baby shots.</td>
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<td>6. I trust my doctor's shot recommendations.</td>
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<tr>
<td>7. I understand that there are small risks to immunization.</td>
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<td>8. I am anxious that too many shots could overwhelm or weaken an infant's immune system.</td>
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<td>9. I think shots hurt my child more than they are worth.</td>
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<td>10. More and more shots are being added to the childhood immunization schedule.</td>
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<td>11. My child cannot get shots if he or she child is sick.</td>
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</table>

12. I have seen a story on TV or in the newspaper in the last week or two that mentions immunization.

Circle One: Yes  No

My age: ______ My child's age: ______

My religion (optional): _________________________

Survey Number: _________________________

My gender: 0 Male  0 Female

My ethnicity: 0 African-American  0 Hispanic
0 White, non-Hispanic  0 Asian
0 Other: _________________________

Thank you for your help today!
APPENDIX J

POSTTEST
Please return this survey in the enclosed postage paid envelope.
No further surveys will be sent to you.

Thank you again for your help!

**My doctor at Children’s Medicine:**  
___________________________

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
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<th>Agree</th>
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</table>

12. I have seen a story on TV or in the newspaper in the last week or two that mentions immunization.

Circle One: Yes  No

13. I remember seeing a poster about immunization in the doctor’s office.

Circle One: Yes  No