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The Impact of the "Learn the Signs. Act Early." Public Health Awareness Campaign on Early Intervention Behavior

By:

Kinjal Prabodh Patel

A Thesis Submitted to the Graduate Faculty of Georgia State University in Partial Fulfillment of the Requirements for the Degree

MASTER OF PUBLIC HEALTH

ATLANTA, GA 30303

The Impact of the "Learn the Signs. Act Early"

Public Health Awareness Campaign on Early Intervention Behavior

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Kinjal P. Patel
The Impact of the "Learn the Signs. Act Early." Public Health Awareness Campaign on Early Intervention Behavior
(Under the direction of Dr. Marshall Kreuter, Faculty Member)

Autism is the fastest-growing developmental disability in the United States. Proactive adult behaviors leading to early intervention are a child's best hope to reach their full potential. The Centers for Disease Control and Prevention partnered with Porter Novelli to develop a public health campaign called "Learn the Signs. Act Early." The goal of this campaign was to increase awareness about the early warning signs of autism to help invoke positive behaviors in parents so that children receive services at the youngest age possible.

HealthStyles survey data were analyzed to assess the difference in level of autism awareness of those surveyed before the campaign launch and of those surveyed two years post-campaign launch. Association between awareness of autism and early intervention behavior was also examined. Results of the study show improvements in awareness of autism issues; however, the results indicate minimal association between awareness and early intervention behavior. Further research efforts are essential to modify the campaign and target the issues necessary to instigate early intervention behavior.

INDEX WORDS: Autism, awareness, knowledge, early intervention behavior, "Learn the Signs. Act Early.", Centers for Disease Control and Prevention, Porter Novelli, public health campaign, *HealthStyles*

CHAPTER I
INTRODUCTION

Autism Background

In the United States, approximately 17 percent of children 17 years of age or younger have a developmental or behavioral disability (Centers for Disease Control and Prevention, 2007b). The Centers for Disease Control and Prevention (CDC) defines a developmental disability as "a diverse group of severe chronic conditions that are due to mental and/or physical impairments." Major life activities such as language, mobility, learning, self-help, and independent living are affected by those living with developmental disabilities (Centers for Disease Control and Prevention, 2007b). Recent studies have shown that developmental disabilities such as autism can be diagnosed as early as 18 months old; however, in an estimated 50 percent of children disabilities remain unidentified until age five, when most enter kindergarten (Centers for Disease Control and Prevention, 2007a).

Autism is a developmental disability that begins in the first three years after birth because of a neurological disorder and can last throughout a person's life. Neurodevelopmental disabilities such as autism affect the normal functioning of the brain and impact development in areas of social interaction and communication skills (Autism Society of America, 2007). Autism is a spectrum disorder, meaning its symptoms can range from mild to severe (National Institute of Mental Health, 2007). Children with an autism spectrum disorder (ASD) develop at different rates in different areas of growth. In the first few years of life, some autistic children reach developmental milestones such as word association and motor skills much sooner than the average child (Centers for Disease Control and Prevention, 2007c), while

other autistic children are significantly delayed (Edelston, 2007). For example, some children may have difficulty learning how to read and write while others are able to attend classes in a mainstream school (Autism Speaks, 2007). Other children may learn more complex skills (e.g. reading long words) before they learn more basic skills (e.g. telling you what sound a 'c' makes) (Centers for Disease Control and Prevention, 2007a).

Autism is the fastest-growing serious developmental disability in the U.S. Autism spectrum disorders affect an estimated 3.4 of every 1,000 children ages 3-10 (National Institute of Mental Health, 2007). Each day, approximately 67 children are diagnosed with an ASD. Reports released in 2007 indicate that 1 in 150 eight year old children in the U.S. have an ASD, making it more common than AIDS, pediatric cancer, and diabetes combined (Autism Speaks, 2007). Reports of increases in autism prevalence have been of great concern to clinicians, educators, and parents in recent years (Newschaffer *et al.*, 2005).

According to the CDC, there is no concrete evidence of exactly what causes autism. Research indicates that there may be multiple causes of ASD, including interaction of both genetic and environmental factors. ASD tends to occur more frequently among individuals who have certain medical conditions such as Fragile X syndrome, tuberous sclerosis, congenital rubella syndrome, untreated phenylketonuria (PKU), and prescription drug use of thalidomide during pregnancy (Centers for Disease Control and Prevention, 2007a). There are currently no cures or preventable measures for autism. Early interventions of ASDs are critical to gaining maximum benefits from existing therapies. Early interventions in effective educational settings

that focus on developing communication, social, cognitive, and motor skills can result in significant improvements in current functioning and functioning in future educational settings for many young children (Centers for Disease Control and Prevention, 2007a). Benefits of early intervention include improved speech, increase social belonging, and decreased aggression (Rogers, 1996). Early detection of autism can also reduce the need for life long interventions, thus increasing the individual's quality of life (Centers for Disease Control and Prevention, 2007a).

The "Learn the Signs. Act Early." Campaign

The CDC, in partnership with Porter Novelli, a global public relations company, developed a targeted public health campaign called "Learn the Signs. Act Early." (LTSAE). The goal of the campaign is to increase awareness about the early warning signs of developmental disabilities, in particular autism, to help ensure that children receive services at the youngest age possible (Centers for Disease Control and Prevention, 2007c). The campaign was launched in July 2004, and it will continue for as long as the program receives funding. LTSAE builds on familiar experiences of parents who monitor their children's growth and expands these to social and emotional milestones such as how children speak, learn, act, and play. The campaign collaborates with partners such as Autism Speaks, American Academy of Pediatrics, Autism Society of America, First Signs, and Organization for Autism Research to disseminate campaign resources and messages (Centers for Disease Control and Prevention, 2007c). Campaign resources and media messages educate parents about developmental milestones and developmental disorders and encourage parents to consult their doctor if they suspect a problem. By increasing awareness of

autism, its signs, and its symptoms, the campaign aims to increase developmental screening, diagnosis, and intervention. Research shows that early intervention has a dramatic impact on reducing symptoms and increasing a child's ability to grow and learn new skills (Porter Novelli, 2004b).

The CDC and Porter Novelli analyzed *HealthStyles* survey data prior to the campaign launch to gain an understanding of the knowledge, beliefs and ideal messages to use in reaching out to health care professionals and parents of young children. *HealthStyles* is a consumer postal mail survey sent to a sample of adults 18 and older which is drawn to be nationally representative on seven U.S. Census Bureau demographic characteristics (Porter Novelli, 2004b). Based on an analysis of survey findings, the objectives of the campaign were determined to be as follows:

- Increase awareness of developmental milestones and early warning signs
- Increase knowledge in the benefits of early action
- Increase parent-health care provider dialogue
- Increase referrals for developmental screening

HealthStyles research helped to determine the target audience for the campaign's objectives. The ultimate campaign goal is to reach the parents through direct contact and/or through their healthcare and childcare provider (Porter Novelli, 2005). The target audience for the campaign includes:

- Parents of young children (ages 4 and younger)
- Health care professionals (pediatricians, family physicians, physician's assistants, nurses)
- Child care and early education providers

Formative research conducted via parent focus groups and telephone interviews with community partners helped determine which methods of information dissemination were most effective in reaching parents. Modes of dissemination include:

- Resource Kits (fact sheets, posters, and information cards regarding autism) which can be ordered for free on the website
- E-cards
- Articles in trade newsletters
- Conference exhibit materials
- Campaign Web site
- PSAs for radio and television
- Print advertising in *Parents, Parenting,* and *Child*
- Media events
- Product placement
- Partnerships with community champions
- Speaker's Bureau

The purpose of this study is to determine the effectiveness of the public health awareness campaign LTSAE on behavior change leading to early intervention in adults with young children. Porter Novelli implemented a survey prior to the campaign launch to assess health beliefs, attitudes, social norms, and behaviors surrounding developmental disabilities. A similar survey was distributed two years (mid-course) into the campaign to assess the same factors. The research questions this thesis proposes to answer include the following:

1. The survey was administered to the target population to assess awareness and knowledge about the early warning signs of developmental disabilities. Is there a statistical difference in awareness of autism in adults with children age four or younger surveyed before the campaign launch and those surveyed two years post-campaign launch?
2. Is there an association between awareness of developmental disabilities and early intervention behavior in adults with children age four or younger? "Early intervention behavior" is operationally defined as "parents initiating a conversation with their doctor regarding the progress of their child's development."

CHAPTER II
LITERATURE REVIEW

The core of the multi-component LTSAE campaign rests on two essential building blocks: 1) evidence of effective health awareness campaigns leading to positive behavior change and 2) an application of appropriate theoretical principles. The CDC and Porter Novelli provide a respectable framework for implementing a successful intervention that addresses principles of awareness and behavior change through the process previously mentioned. The following literature review provides a thorough overview of various awareness campaigns intended to provoke healthy actions when dealing with issues such as sexually transmitted diseases, safer sex, nutrition, physical activity, and epilepsy. The review concludes with identification and explanation of the theories used to inform the planning and implementation of the campaign.

Background: Awareness Campaigns

Health awareness campaigns are programs that disseminate educational messages to promote awareness or behavior change to a targeted population through channels that reach a large audience (Bertrand *et al.*, 2006). These channels include, but are not limited to, radio, television, internet (Bertrand *et al.*, 2006), pamphlets, flyers, posters, conferences (Porter Novelli, 2004b), newsletters, schools, and churches (Green & Kreuter, 2005). Thompson defines awareness as the recognition of a topic or practice to trigger activation among audiences. There is contradicting evidence on the impact of awareness campaigns on health outcomes (Hornik, 2002). Numerous studies have shown that exposure to education-based awareness campaigns are associated with positive health

behavior change (Sood & Nambiar, 2006) while others show little or no effect (Hornik, 2002).

Mass media campaigns tend to utilize three basic communication processes, awareness, instruction, and persuasion, to move the target audience toward the desired response. Awareness campaigns inform the audience what to do, specify who should do it, and provide information about where and when it should be done. The definition of awareness encompasses attitude creation or change through knowledge gain or belief formation. The relative emphasis of the message will vary at different points of the campaign for different audiences based on the existing pattern of knowledge and attitudes of the audience (Thompson, 2003). For example, the LTSAE campaign creates awareness among all caregivers of children age four or younger (e.g. parents, daycare providers, preschool teachers, pediatricians, and public health professionals). The ultimate goal is to reach the parents of the children through various points of contact so they are well equipped with the knowledge necessary to intervene as soon as possible in the case of a developmental disability. Therefore, the campaign messages will vary at different points of the campaign depending on whether the target audience is a physician or a parent (Porter Novelli, 2004b).

Researchers have assessed the impact of health awareness campaigns using surveys and experimental designs over the past several decades (Weeks, 2001). The objective of most awareness campaigns is to attain behavior change (Alcalay, 1983). Awareness campaigns have been used to promote positive behavior, reinforce positive behavior, and reduce risky behavior (Kreuter & Strecher, 1996).

Effective Awareness/Behavior Change Campaigns

Research on the effectiveness of HIV/AIDS awareness campaigns on behavior change has been significant in the health promotion field. In a meta-analysis of 15 studies conducted on behavior change in developing countries, radio, television, video, print, and the internet were used to disseminate messages to produce awareness among the population. The studies measured the number of sexual partners in the past year, percentage of men engaging in casual sex, and percentage avoiding commercial sex. Results of the studies showed that knowledge of HIV transmission had a significant impact in the reduction of the high-risk sexual behaviors examined (Bertrand et al., 2006). Similarly, in a school-based study in Mongolia, numerous schools were exposed to a peer education program for HIV prevention while other schools in the same area were not. Students in the schools with the program were statistically more knowledgeable and had greater self-efficacy in regards to HIV and sexual health. Students that had small teams of peer educators had higher levels of safe sex practice than the control groups; however, schools that had large teams of peer educators showed no statistical significance in increased levels of safe sex practice (Cartagena *et al.*, 2006).

Many entertainment-education-based HIV/AIDS awareness campaigns have been associated with reduction in high-risk behaviors. Creating awareness through TV dramas, reality shows for youth audiences, and TV spots has been shown to be significant, influencing behavior change and showing strong association with positive interpersonal communication (Sood & Nambiar, 2006).

Other sexually transmitted diseases such as syphilis have also been the central issue in awareness campaigns. From 1999-2002, the San Francisco Department of Health

launched a social marketing campaign called Healthy Penis 2002 due to the sharp increase in early syphilis among gay and bisexual men. The campaign aimed to increase syphilis testing by increasing awareness and knowledge concerning disease transmission. Healthy Penis 2002 was successful in achieving its goal and there was a significant correlation between syphilis testing and campaign awareness (Montoya *et al.*, 2005). Furthermore, an evaluation of three Dutch campaigns centering on safer sex concluded that not only can awareness campaigns be associated with positive behavior change, but also when campaigns are discontinued, individuals may revert to their original behavior. The study concluded that awareness campaigns are needed to maintain safer sex practice and future campaign goals should be formulated in terms of compliance (Yzer *et al.*, 2000).

In the 'Treatwell 5-a-Day for Better Health Campaign', the effectiveness of a communication intervention to increase the consumption of fruits and vegetables to five or more servings a day was examined. The modes of information dissemination included a family newsletter, family festivals and material mailings, a learn-at-home information packet, and a worksite educational program. Analysis of surveys taken after the campaign ended indicated a 23% increase in individuals consuming five or more servings of fruits and vegetables a day. Furthermore, it was found that consumption of fruits and vegetables was directly associated with level of household support for healthy eating. The study concluded that increase in knowledge and awareness because of the campaign had the potential to enhance positive eating habits. The analysis also pointed out that social norms play a crucial role in influencing health behaviors (Sorensen *et al.*, 1998).

A nutrition awareness program in Bergen, Norway incorporated healthy eating education into home economics courses in junior high schools. A survey evaluation of the campaign revealed that females who enrolled in the home economics course reported healthier eating behaviors both at five and twelve month follow-ups. Males reported a sustained positive impact on healthy eating knowledge but a short-term healthier eating behavior. Results supported the feasibility of integrating education campaigns into existing school courses as an effective method for positive behavior change (Klepp & Wilhelmsen, 1993). A physical activity campaign in Providence, Rhode Island revolved around worksite and communications-based promotion of a local walking path. Promotional messages were distributed in the workplace for one month via email, flyers, website postings, and bi-weekly information booths. A survey evaluation conducted at baseline, during, and following the promotional campaign showed statistically significant increases in walking activity associated with increased knowledge of physical activity (Napolitano *et al.*, 2006).

Instigating or promoting the initiation of treatment-seeking behavior is frequently cited as a principle goal of awareness/education programs. A campaign in Northern Malaysia called Female Lower Urinary Tract Symptoms (FLUTS), was held at various selected sites, including hospitals, institutions, and residential areas. An interview-based survey was conducted by representatives of FLUTS to determine the prevalence, severity, and treatment seeking behavior for FLUTS. Results showed a disproportionately low percentage of patients with FLUTS seeking treatment despite its severity and impact on quality of life. The analysis revealed that lack of understanding of FLUTS and ignorance of avenues to receive treatment were major causes for not seeking medical help. The

study helped build a strong case for the need for effective dissemination of information regarding FLUTS through a properly structured healthcare system (Low *et al.*, 2006). Similarly, in 2003, a study in China regarding Severe Acute Respiratory Syndrome (SARS) and change in people's health behavior demonstrated the importance of awareness campaigns. Three activities – case detection, patient isolation, and contact tracing were found to be significantly associated with reduction in the number of people exposed to SARS. These activities were thought to break the chain of transmission from infected to healthy persons. Unfortunately, these three activities brought panic and chaos to citizens who were unaware of the specifics of the epidemic. People were unaware of simple ways – such as washing their hands – to protect themselves from SARS. The study documented the need for health promotion and information dissemination efforts during crises to best control an epidemic. Results of the study consistent with the construct of 'perceived severity' in the health belief model revealed that when people perceive a health problem as serious, they are more likely to take some kind of action. The study recommended that health information on SARS be adapted to various socio-demographic groups to best increase access and understanding (Tan *et al.*, 2004).

Along with increasing positive behaviors, decreasing negative behaviors is equally important. The overuse of antibiotics to treat upper respiratory tract infections (URTIs) is a topic in awareness campaigns. Australia's National Prescribing Service undertook a comprehensive consumer awareness, beliefs, attitudes, and behavior change program for use of various antibiotics. Key messages and visual images were broadcasted in various settings including general practice physician offices, community pharmacies, child-care centers, and community groups. Messages were integrated into

newsletters, brochures, billboards, television, magazines, and radio. The positive changes attributed to the effectiveness of the campaign were confirmed by a national decline in total antibiotic prescriptions filled in the community from 23.08 million prescriptions in 1998-9 to 21.44 million in 2001-2. Specifically, 216,000 fewer prescriptions for URTIs were filled in the time frame (Wutzke et al., 2006).

Florida's 'truth' anti-tobacco media campaign spread information about tobacco companies and their deadly, addictive products so people could make decisions about smoking based on facts. Cumulative gross rating points (GRP's) were used to measure exposure of the campaign. The GRPs measured the total volume of delivery of the campaign to a target audience (students in junior high and high school). Survey data was used to assess campaign awareness, confirmed awareness, and receptivity (Farrelly *et al.*, 2005). By the end of the first year, results showed that Florida youth had a stronger anti-tobacco attitude and fewer negative smoking behaviors than the comparison population. Results showed significant changes in attitudes/beliefs, and reduced rates of negative smoking behavior in youth (Sly *et al.*, 2001). The study showed that the campaign was associated with substantial declines in youth smoking. Between 1999 and 2002 smoking prevalence among the study population decreased from 25.3% to 18.0% (Farrelly *et al.*, 2005).

Medical sociologists have studied the effects of stigma on various types of diseases such as HIV/AIDS, mental illness, autism, tuberculosis, leprosy, and cancer (Fife & Wright, 2000). Research has shown that disease stigma can have a variety of negative effects on testing, willingness to disclose disease status, health-seeking behavior, quality of health care received, and social support (L. Brown *et al.*, 2003).

Mass media awareness campaigns and education campaigns are essential in combating the problem of stigma (W. Brown, 2006). To understand the prevalence and trends related to HIV/AIDS stigma, The University of California at Berkeley conducted telephone surveys in 1997. The types of questions that were included in the survey addressed three main issues: negative feelings toward People with AIDS (PWAs), responsibility and blame, and beliefs about HIV transmission. The prevalence of AIDS stigma and misinformation about HIV transmission were then compared to a similar survey conducted in 1991. However, results showed that approximately one fifth of respondents still feared PWAs. Close to one sixth expressed disgust or supported public naming of PWAs. The survey also indicated signs that the sorts of beliefs and opinions that provide a foundation of HIV/AIDS stigma continue to be widespread. A crucial study finding was the fact that survey takers (national probability samples of English-speaking adults) were not clear of the ways HIV can be transmitted. The results of the survey illustrate that public health practitioners need to be aware that HIV/AIDS stigma persists in the United States and health workers may be able to counter stigma surrounding HIV transmission through proper awareness and education campaigns (Herek *et al.*, 2002). A study conducted in Kerala, India assessed the knowledge, attitude, and practice (KAP) with respect to epilepsy among school children. Among the 1213 tenth-grade students surveyed, 60% thought that epilepsy was a form of insanity. Other misconceptions included beliefs that epilepsy is a contagious disease, a hereditary disease, and the result of a relative's sin. The lack of knowledge regarding epilepsy was found to be an important determinant of misconceptions and negative attitudes towards

people with the condition. Education is crucial step in easing stigma towards epilepsy and other medical conditions (Pandian *et al.*, 2006).

Parent involvement is a key factor in understanding health behavior change in children. In a health intervention for dietary fat and sodium consumption, it was found that parent involvement played a large role. 2,250 third grade students in Minnesota were either placed in a school-based or home-based program. The school-based program was a five-week course taught by third grade teachers. The home-team program involved receiving five packets mailed to each third grader's home on a weekly basis. Each packet contained an adventure story involving nutrition education and a family game using a baseball motif centered on activities concerning eating pattern changes. A pre-program assessment and post-program assessment were used to evaluate the campaign. According to the tests given to participants at the end of the program, students in the school-based program gained more knowledge. However, students in home-based programs reported more behavior change, reducing total and saturated fat in their diets (Perry *et al.*, 1998). Similarly, in another diet and physical activity health promotion campaign called CATCH, it was found that including a family component with a school-based intervention resulted in statistically significant results of increased knowledge and attitudes towards healthy habit changes. The number of activity packets that an adult completed with their child measured parent participation. Children were also given a test after they completed the program. This study illustrates a positive dose analysis of the family component of a health campaign by measuring the level of parent involvement (Nader *et al.*, 1996).

Campaigns Tailored to Healthcare Professionals

Health awareness and education programs can be tailored to many populations, including healthcare providers. A meta-analysis of several awareness campaigns tailored to health care professionals have pointed out that health services research has often had a gap between research-based best clinical practice and actual doctor performance (Grimshaw *et al.*, 2002). Therefore, continued medical education (CME) is necessary to attain desired health outcomes (Grimshaw et al., 2002). There is very little evidence to support that educational resources, education outreach, and guidelines dissemination of CME/training alone have any impact on provider behavior (Tu & Davis, 2002). There is evidence to support that 'academic detailing' –i.e., having a physician interact via face-to-face meetings to support a desired behavior change is effective but is very time consuming and expensive. Reminder systems are effective, but there have not been many trials involving them (Baker *et al.*, 1999). Multi-component initiatives have had a positive impact on behavior change; however, the effectiveness seems to rely very heavily on a number of factors. Limited understanding of contextual, organizational, individual, and behavioral factors may influence the effectiveness of different campaigns. Research indicates that implementation of effective strategies requires a better understanding of the determinants of physician behavior change, as well as identification of the barriers to change and facilitators of change (Grimshaw *et al.*, 2002). Education campaigns tailored to specific populations have proven to be effective in comparison to general population campaigns (Thompson, 2003). However, regarding behavior change in healthcare providers, further research is needed to design an effective behavior change campaign (Grimshaw et al., 2002).

The role of physicians in changing patient behavior is also important. In a study conducted in Massachusetts, forty-five primary care internists belonging to a health maintenance organization received training for 1) usual care, 2) physician nutrition counseling training, and 3) physician nutrition counseling training plus an office-support program. Sixty-two patients with total blood cholesterol levels in the highest 25th percentile were recruited for the program. Physicians received training on brief patient-centered interactive counseling and the use of an office-support program that included in-office prompts, algorithms, and simple dietary assessment tools. Evaluation after one year of the program showed a significant association between doctor consultation and positive behavior change resulting in reduction of saturated fat intake, weight, and cholesterol levels. Results concluded that physician nutrition counseling can produce beneficial changes in patient behavior such as diet, weight, and blood lipids (Ockene *et al.*, 1999).

Theories Applied in the LTSAE Campaign

Given the goals and primary target audience (adults with children age four and younger) of the LTSAE campaign, the organizational planners utilized The Theory of Reasoned Action, Social Cognitive Theory, and Transtheoretical Model as the principle theories in the development and evaluation of the campaign.

A. The Theory of Reasoned Action

The Theory of Reasoned Action (TRA) addresses the influence of cognitive components such as changes in beliefs, knowledge (Thompson, 2003), attitude, social norms, and intentions on behavior (Guo *et al.*, 2006). Icek Ajzen and Martin Fishbein,

social psychologists, were the originators of the TRA model. Previous psychologist have described attitude as individual mental processes that can determine a person's actual and potential responses. Fishbein and Ajzen took the existing theories a step forward to examine methods to predict behaviors and outcomes. The TRA has three main purposes: 1) to predict and understand motivational influences on behavior, 2) identify how and where to target strategies for changing behavior, 3) and to explain nearly any human behavior. This theory provides a framework to study the target audiences' attitudes toward behaviors. The TRA focuses on intention as the most important determinant of a person's behavior (Fishbein & Middlestadt, 1987). Intention is a combination of attitude toward performing a behavior and subjective norms (Kreuter *et al.*, 2003). Thompsan defines intention as "the plan individuals have about whether or not they intend to perform the recommended behavior," while "behavior is the actual performance of the recommended response." Attitude is defined as the evaluation of self, individuals, groups, and other objects (Rydell & McConell, 2006). Social norms are "standards of behavior that are based on widely shared beliefs how individual group members out to behave in a situation (Thompson, 2003)" The group can be a family, peer group, organization, or an entire society (Walker *et al.*, 2003).

The TRA has been used in various campaigns. In a school-based intervention designed to reduce soft drink consumption, attitudes and subjective norms played a significant role in 'intention' to change behavior. Soft drink education was incorporated into school lesson plans. At the end of the year, surveys were implemented to evaluate the program. Researchers concluded that reduction in soda consumption is possible if healthy eating messages are targeted to teenagers' family and friends and well as the

individual. Intention to drink regular soda was found to predict its consumption. The key elements contributing to behavior in this campaign were identified as income, attitudes, and social norms (Kassem et al., 2003; Klepp & Wilhelmsen, 1993). Another example of a campaign that uses the TRA as a building block is Canada on the Move (COTM). The campaign promoted pedometer use and walking amongst adult Canadians. The campaign's theme was 'add 2000 steps' and the specific COTM tagline was 'donate your steps to health research.' COTM messages were distributed via cereal boxes where information about pedometer usage and ownership were displayed. Data were collected via the monthly rolling sample containing 9935 adults 18 or older. The campaign was successful in raising awareness of campaign messages. In addition, increased knowledge of pedometer use and ownership were associated with pedometer use. Before the launch of the COTM, 1.5% of the sample owned a pedometer and none had obtained one through the campaign. One year after the campaign launch, 7.4% of adults had obtained a pedometer from a cereal box. Researchers in the study recognized the series of causal variables from messaging to behavior change as: exposure > awareness > knowledge > attention > intention > behavior change. One year post campaign launch, there was a 13% increase in the likelihood of sufficient walking (Craig *et al.*, 2006).

The TRA provides insightful information in the planning and implementation of the LTSAE campaign. Survey questions used in evaluation of the planning stage of the campaign include:

1. How important of a problem is autism?
2. What do you believe can cause autism?

These questions aim to investigate the attitudes associated with autism. Understanding

the individuals' mental processes regarding autism help predict the influence on behavior as well as determine what topics need to be targeted in the campaign. In the following question, the role of social norms on behavioral outcomes is examined:

3. Who can best see the early signs of autism?

In the context of LTSAE, who the individual believes can see the early sign of autism reflects their social support system which in turn influences their behavior. The baseline data allowed the campaign designers to target the appropriate audiences who act as support systems and influence parents' social norms (physicians and healthcare providers). In combination, the previous three questions help to gauge the intention of behavior change.

B. Social Cognitive Theory

Self-efficacy is an integral component of Bandura's Social Learning Theory (Kreuter *et al.*, 2003) which was later broadened to become the Social Cognitive Theory (SCT) (Green & Kreuter, 2005). The SCT explains how people acquire and maintain certain behavioral patterns through learning and empowerment providing a basis for campaign strategies (Green & Kreuter, 2005) . Self-efficacy is defined as "the perceived ability to achieve an outcome through one's own action" (Thompson, 2003). There are many factors that influence an individual's self-efficacy such as awareness and knowledge of a condition, financial costs, fear, physical discomfort, and environmental limitations (Thompson, 2003).

Smoking awareness campaigns often deem self-efficacy as a determinant of changing smoking behavior. In a study examining determinants of change in smoking behavior among women in the fertile age range 935 women aged 15-45 years returned a

questionnaire with questions about their smoking behavior. Questions assessed socio-economic status information, self-efficacy, beliefs, status wish to have children, and stage of readiness to change. Facts about the health outcomes of smoking during pregnancy and after conception were provided to women in a study group before they were asked the survey question: "You decide to stop smoking in the period in which you are trying to become pregnant and in the three months after conception. Do you expect to be able to realize that target?" Women with the intention to get pregnant showed a positive association between knowledge and behavior change (p=.001). 75% of the women who did not wish to get pregnant continued smoking. The women reported a very low personal self-efficacy in the study. This study illustrates a strong association between intention and self-efficacy; both important determinants in forecasting behavior change (Siero *et al.*, 2004). In the Stanford Arthritis Self-Management Program (ASMP), education and self-efficacy play a vital role in improving health-related quality of life in people with hip or knee osteoarthritis. Information regarding management of pain and fatigue, physical activity, medication usage, managing anger, fear and frustration, solving health-related problems, and communication with doctors was provided to 600 participants in the form of a seminar. The primary aims of the study were to (1) measure self-efficacy and (2) sustain a positive behavior change. Ongoing evaluations have shown a positive association between increased knowledge and behavior change, however; reduction of pain and disability has been minimal thus far. The program continues to be studied and if ASMP proves to be cost-beneficial, the program hopes to gain support from clinicians caring for people with Osteoarthritis (Osborne *et al.*, 2006).

The LTSAE campaign attempts to increase self-efficacy by providing the target audience with information about developmental milestones their child should be reaching so they themselves can spot the early signs of autism. The surveys used in the evaluation of the campaign measure self-efficacy with the following two questions:

1. During my child's last well-child visit, I gave the nurse or doctor information about how my child plays, acts, speaks, or learns.
2. I look for the developmental milestones my child should be reaching in terms of how he plays, acts, speaks, and learns.

Transtheoretical Model/Stages of Change theory

The stages of change theory describes how people modify a problem behavior or acquire a positive behavior (Curry *et al.*, 1992). The transtheoretical model is a useful starting point for understanding how doctors influence behavior change in patients. Patients are not a homogenous group when it comes to behavior change. Doctors must identify the stage of change their patient currently resides and treat the consultation accordingly (Rollnick & Mason, 1999). In preparation for implementing an obesity management program, a prospective study was conducted to assess readiness to change among family practice patients. Six target behaviors were examined: 1) increased planned exercise, 2) increased usual physical activity, 3) increased portion control, 4) increased fruit intake, 5) increased vegetable intake, and 6) reduced dietary fat consumption. Using the stages of change theory, physicians were able to recognize what stage patients belonged to in order to determine specific behavioral interventions. Based

on study results, a specialized obesity treatment program was designed (Longue *et al.*, 2000).

Prochaska and DiClemente's theory proposes that there are five stages of behavior change: precontemplation, contemplation, preparation, action, and maintenance. LTSAE's objectives were developed using these stages. Campaign objectives that fall under the precontemplation, contemplation, and preparation stage of the transtheoretical model (Prochaska & Velicer, 1998) include: 1) increased awareness of developmental milestones, 2) increased awareness of the early warning signs of developmental disabilities, and 3) increased knowledge in the benefits of early action. Objectives designated to the action stage include: 1) increased dialogue about milestones and warning signs (early intervention behavior), 2) increased referrals for developmental screening (Porter Novelli, 2004a). The LTSAE campaign was planned according to the stages of change theory in efforts to create awareness about developmental milestones so that the target audience would begin thinking about changing behavior and then ultimately acquire the positive behavior resulting in early intervention of autism (Centers for Disease Control and Prevention, 2007c). Long-term goals fall under the maintenance stage of the transtheoretical model and involve improving autism-related systems that reduce the impact of developmental disabilities among children and reinforce total child development (Porter Novelli, 2004a).

Theory-based interventions addressing multiple determinants of behavior change are considered to be successful in campaigns aimed at changing behavior (Walker et al., 2003). Attitudes, social norms, behavioral intentions, and self-efficacy have all been important variables in the LTSAE campaign. Upon examining evidence from effective

health awareness campaigns leading to positive behavior change and major theoretical constructs, the literature review in combination with research and knowledge of LTSAE provided by Porter Novelli and the CDC has provided a solid basis for identifying variables that need to be examined in the analysis.

CHAPTER III
METHOD AND PROCEDURES

The purpose of this study is to 1) assess the difference in awareness of autism of adults with children age four or younger who were surveyed before the LTSAE campaign launch and those surveyed two years post-campaign launch, and 2) determine if is there is an association between awareness of autism and early intervention behavior. "Early intervention behavior" is operationally defined as "parents initiating a conversation with their doctor regarding the progress of their child's development."

Porter Novelli, partnered with CDC, utilized its *HealthStyles* research database designed specifically to map health beliefs, attitudes, social norms, and behaviors surrounding important pubic health concerns to conduct national surveys of parents of young children.

HealthStyles is a proprietary database product of Porter Novelli and is licensed by the CDC for audience analysis in health communication planning. *HealthStyles* is a part of a survey system called *Styles*. Synovate Inc. conducted the sampling and data collection. The CDC hired Synovate Inc. to act as a survey consultation firm. Synovate recruited consumers to join the Synovate Consumer Opinion Panel through direct mailing to household lists. The entire mail panel consists of approximately 450,000 potential respondents. Participants who completed the *HealthStyles* survey were given $2 and were entered into a sweepstakes for other prizes. Demographics were selected on the ability to produce a U.S. nationally balanced sample. The sample was then stratified based on sex, marital status, race/ethnicity, income, age, regions, household size, and population density.

IRB and Data Management

The protocol for this study was reviewed and approved by the Georgia State University Institutional Review Board (IRB) on March 26, 2007, under the exempt review process. All of the data used for this research were secondary data from the *HealthStyles* 2004 and 2006 consumer mail panel databases. The data exist with no identifiers in electronic format, and they were stored on a password-protected computer hard drive. There were no sensitive data used in the original data collection and none of the data are publicly available.

Research Design

Synovate Inc. conducted two independent cross-sectional surveys among different populations in a nationally balanced sample. Stratified random sampling was used to generate a list of 20,000 potential respondents who would receive the survey. The sample was then stratified (or balanced) based on region, household income, population density, age, and household size in order to create a nationally representative sample. A low income/minority supplement was used to ensure adequate representation of these groups. The study population for this research consists of consumers. Consumer surveys collect data on general media habits, product use, interests, and lifestyle are (Centers for Disease Control and Prevention, 2007b). The sample for this study includes respondents who returned the *HealthStyles* 2004, 2004 re-contact, and 2006 survey.

The 2004 survey was sent to 6,175 mail panel households and 4,345 were returned. Participants who responded 'yes' to having at least one child four years old or younger were sent a re-contact survey that included additional questions relating to autism and developmental disabilities. 267 individuals responded to the re-contact

survey. The data from the 2004 and 2004 re-contact surveys were merged to generate the 2004 baseline data.

The *HealthStyles* 2004 survey consisted of the following questions:

1. How important of a problem is autism?
2. What do you believe can cause autism?
3. What is the best time to get help for children with autism?
4. Which behavior most suggests that a child may have autism?
5. Who can best see the early sign of autism?
6. If a doctor tells a worried parent to wait and see if a child outgrows a developmental problem, what do you think the parent should do?

The *HealthStyles* re-contact survey included the following questions:

1. I am aware of the developmental milestones my child should be reaching in terms of how he plays, acts, speaks, and learns.
2. I believe my child's doctor shares with me the most recent information on childhood development.
3. During my child's last well-child visit, the nurse or doctor asked me about how my child plays, acts, speaks, or learns.
4. I look for the developmental milestones my child should be reaching in terms of how he plays, acts, speaks, and learns.
5. During my child's last well-child visit, I gave the nurse or doctor information about how my child plays, acts, speaks, or learns.

6. During my child's last well-child visit, I asked the nurse or doctor about how my child should play, act, speak, or learn.

The 2006 survey was sent to 6,500 mail panel households and 5,251 were returned. The *HealthStyles* 2006 follow-up survey included all of the questions from the 2004 survey and the following two questions from the 2004 re-contact survey.

- I look for the developmental milestones my child should be reaching in terms of how he plays, acts, speaks, and learns.
- During my child's last well-child visit, I asked the nurse or doctor about how my child should play, act, speak, or learn.

One additional question was added to the 2006 survey.

- I have heard of the Centers for Disease Control and Prevention's Campaign – "Learn the Signs. Act Early."?

Research Variables

In order to assess the differences in response to autism awareness questions before and after the launch of the "Learn the Signs. Act Early." campaign, the following survey questions were examined:

1. How important of a problem is autism?
2. What do you believe can cause autism?
3. What is the best time to get help for children with autism?
4. Which behavior most suggests that a child may have autism?
5. If a doctor tells a worried parent to wait and see if a child outgrows a developmental problem, what do you think the parent should do?

6. I look for the developmental milestones my child should be reaching in terms of how he plays, act, speaks, and learns.

To evaluate the association between autism awareness and early intervention behavior in adults with children age four or younger, the following survey question was analyzed:

- During my child's last well-child visit, I asked the nurse or doctor for information about how my child should play, act, speak, or learn.
- Demographic variables included gender, age, race/ethnicity, household income, education level, and marital status.

Definition of Terms

The study has two key terms: "autism awareness" and "early intervention behavior." Autism awareness is defined as increased knowledge or recognition of autism or developmental disabilities (Thompson, 2003). Early intervention behavior is defined as positive action taken towards early intervention of autism (Thompson, 2003); specifically, a parent asking their doctor for information about how their child should play, act, speak, or learn.

Data Analysis

SPSS Version 15.0 was utilized for this analysis and data was prepared following three steps.

1. 2004 data and the re-contact data were merged to create the 2004 baseline data.
2. 2004 baseline data and 2006 data were merged to create one file with all available data.

3. Data was stratified to reflect the campaign's target audience: adults with at least one child age four or younger.

Pearson's chi square tests were used to examine the demographic characteristics of the study population. To assess the extent of participants' awareness of autism, descriptive statistics were used to examine frequency distributions for each question that measured awareness. To test whether the differences between the year 2004 and 2006 were significant, Pearson's chi-square tests were used. Univariate and multiple regression logistic analyses were performed using early intervention behavior as the dependent variable and awareness as the independent variable. In the multivariate analysis, adjustments were made for gender, race, age, household income, and marital status. A p-value of .05 or less or 95% confidence intervals were used to ascertain statistical significance.

CHAPTER IV
RESULTS

A total of 4,345 respondents returned the *HealthStyles* 2004 survey. 267 adults had at least one child age four or younger and completed both the 2004 survey and 2004 re-contact survey (6.14%). Of the 5,251 respondents who returned the 2006 survey, 638 adults had at least one child age four or younger (12.2%). Collectively, there were a total of 905 eligible adults with at least one child age four or younger in the entire study population (Table 1).

Table 1. Number of eligible adults with at least one child age four or younger in 2004 and 2006 (n=905)

Characteristic	Total Respondents				
	YR 2004		YR 2006		
Survey subjects	4345		5251		YR 2004+2006
	n	%	n	%	n
Eligible respondents with at least one child Age four or Younger	267	6.14	638	12.15	905

Table 2 provides descriptive demographic information about the respondents including their gender, race/ethnicity, age, household income, marital status, and education level. There were not statistical difference in demographic characteristics between the 2004 and 2006 population except for marital status (p=.002). The 2004 baseline data included more females (53.2%) than males (46.4%) as did the 2006 survey, which also had more female respondents (61.6%) than males (38.4%) (p=.026). A little more than half (58.4%) of the participants were white which was also the case in 2006 (61.9%) (p=.143). The majority of the respondents were between the ages of 25-44 in 2004 (82.4%) and 2006 (80.9%) (p=.221). Similarly, the majority of participants were married in 2004

(83.1%) and 2006 (82.0%) (p=.002). Approximately one-third of the study population had an income of $60k or higher in 2004 (36%) and 2006 (38.6%) (p=.370). Close to three-fourths of the participants' education level was college or higher in 2004 (70%). In 2006 four-fifths of the populations' education level was college or higher (84.5%).

Table 2. Demographic characteristics of respondents with at least one child age four or younger (n=905)

Characteristic	Respondents with at least One Child Age Four or Younger				
	YR2004		YR2006		P-Value
	n=267		n=638		
	n	%	n	%	
Gender					
Male	124	46.4	245	38.4	.056
Female	142	53.2	393	61.6	
Race/Ethnicity					
White	156	58.4	395	61.9	.143
Black	43	16.1	68	10.7	
Hispanic	44	16.5	119	18.7	
Other	23	8.6	56	8.8	
Age					
18-24	18	6.7	68	10.7	.221
25-34	115	43.1	263	41.2	
35-44	105	39.3	253	39.7	
45-54	22	8.2	34	5.3	
55-64	3	1.1	14	2.2	
65+	3	1.1	6	.9	
Household Income					
Under $15K	28	10.5	88	13.8	.370
$15K - $24.9K	26	9.7	64	10.0	
$25K - $39.9K	46	17.2	106	16.6	
$40K - $59.9K	70	26.2	134	21.0	
$60K+	96	36.0	246	38.6	
Marital Status					
Married	222	83.1	523	82.0	.002
Widowed	1	.4	1	.2	
Divorced	9	3.4	18	2.8	
Separated	4	1.5	6	.9	
Never Married	29	10.9	48	7.5	
Education Level					
Attended Elementary School	1	.4	3	.5	.869
Graduated Elementary School	14	5.2	4	.6	
Attended High School	60	22.5	36	5.6	
Attended College	106	39.7	156	24.5	
Graduated College	57	21.3	256	40.1	
Attended 5-8 Years School/Grad School	24	9.0	127	19.9	

Merged 2004 and 2006 data were used to analyze differences in awareness of autism in 2004 versus 2006. Pearson's chi-square tests assessed significance at the .05 level. In the question "How important of a health problem is autism?", awareness was measured by those who answered important. Respondents who answered important increased from 66.9% in 2004 to 76.6% in 2006 (p=.003). Participants were also given the question 'What do you believe can cause autism?' and were asked to indicate which causes they believed to be correct. The answers given were either incorrect answers (mother's behavior, improper parenting) or answers that have not yet been proven (genetics, environmental exposures, vaccines) to be attributable to causing autism. There was a significant decrease (10.2% to 5.6%) in parents who marked improper parenting as a correct answer (p=.021). Other answers also showed fluctuations from 2004 to 2006; however, none of the differences were significant. Respondents who correctly answered 'before the age of two" for the question "What is the best time to get help for children with autism?" increased from 40.2% in 2004 to 49.4% in 2006 (p=.013). Parents were asked to pick out signs of autism. Those who responded correctly with the answer 'the child is not using words by age two and loses some words,' significantly increased in 2006 from 36.1% to 44.7% (p=.010). There were decreases in percentages for the correct answers (consult with another doctor, enroll their child in early education services) for what a parent should do if their doctor tells them to wait and see if their child outgrows a developmental problem; however the decreases were not significant (.307,.079). The response of interest for the statement "I look for developmental milestones my child should be reaching in terms of how he or she acts, speaks, plays, and learns" was agree. Participants who answered agree increased from 2004 to 2006 (p=.023)

Table 3. A comparison of variables that measure autism awareness in 2004 versus 2006 (n=905)

Survey questions measuring awareness	**YR2004**	**YR2006**	
	%	%	p-value
How important of a health problem is autism?			
Important[a]	66.9	76.6	.003
What do you believe can cause autism?			
Mother's behavior	27.4	23.2	.203
Environmental exposures	27.4	29.6	.521
Improper parenting	10.2	5.6	.021
Genetics	46.2	45.6	.884
Vaccines	12.8	13.6	.731
Don't Know	44.7	44.8	1.0
What is the best time to get help for children with autism?			
Before the age of two	40.2	49.4	.013
What behavior most suggest that a child may have autism?			
The child is not using words by age two and loses some words	36.1	44.7	.010
If a doctor tells a worried parent to wait and see if a child outgrows a developmental problem, what do you think the parent should do?			
Take their child to another doctor or specialist	54.1	50.3	.307
Enroll their child in an early education services	25.9	20.5	.079
I look for developmental milestones my child should be reaching in terms of how he plays, acts, speaks, and learns.			
Agree[b]	76.0	82.9	.023

Note:
[a]Important was defined as answering very important or important on the Likert scale
[b]Agreement was defined as answering strongly agree or agree on the Likert scale

2006 survey data were analyzed to determine the association between awareness of autism and early intervention behavior post campaign launch. Sixteen variables that measured awareness of autism were compared to the early intervention behavior question "During my child's last well-child visit, I asked the doctor for information about how my child should play, act, speak or learn."

Risk was estimated using odds ratios from unadjusted (Table 4, Model 1) and adjusted (Table 5, Model 2) logistic regression analyses. In the unadjusted models, three of the thirteen (23.1%) survey questions that measured awareness were significantly associated with early intervention behavior. Respondents who agreed that they should take their child to another doctor if their doctor tells them to wait and see if a child outgrows a developmental problem compared to respondents who did not agree were 1.49 times more likely to ask their doctor for information about how their child should play, act, speak, or learn (95% CI: 1.04-2.15). Similarly, participants who believed that they should enroll their child in an early education service program if their doctor recommends waiting for the child to outgrow a developmental problem were 1.60 times more likely to engage in early intervention behavior than parents who did not think they should enroll their child in an early education service program (95 CI: 1.01-2.52). Lastly, parents who look for developmental milestones in their children were 31.5 times more likely to engage in early intervention behavior than participants who did not look for developmental milestones in their children.

To investigate the contribution of awareness generated from each survey question to early intervention behavior; awareness variables were adjusted for gender, age, race,

household income, and marital status variables. In this analysis, participants who believed that they should enroll their child in an early education service program if their doctor recommended waiting for the child to outgrow a developmental problem compared to respondents who did not believe they should enroll their child in an early education service program were not significantly associated with early intervention behavior (95% CI: .877-2.27). The likelihood of engaging in early intervention behavior for respondents who agreed that they should take their child to another doctor if their doctor tells them to wait and see if a child outgrows a developmental problem compared to parents who did not agree increased from 1.49 to 1.54 (3.35%) when variables were adjusted (95% CI: 1.06-2.26). Lastly, the odds of early intervention behavior for participants who look for developmental milestones their child should be reaching compared to parents who don't look for developmental milestones their child should be reaching also increased from 31.5 to 41.7(32.4%) in Table 5 (8.90-193.3)

Table 4. Association between early intervention behavior and awareness of autism (n=638)

Variable	Model I	
	OR	95% CI
How important is the problem of autism?		
Very important or important (Important)	1.71	.486-6.00
Do you believe the following factors can cause autism?[b]		
Mother's behavior	.673	.434-1.05
Environmental exposures	.974	.656-1.45
Improper parenting	1.37	.675-2.79
Genetics	.994	.692-1.42
Vaccines	1.311	.777-2.21
Don't Know	.972	.675-1.40
What is the best time to get help for children with autism?[c]		
Before the age of two	1.32	.830-2.11
What behavior most suggest that a child may have autism?[c]		
The child is not using words by age two and loses some words	.930	.844-1.12
If a doctor tells a worried parent to wait and see if a child outgrows a developmental problem, what do you think the parent should do?[d]		
Take their child to another doctor or specialist	1.49	1.04-2.15
Enroll their child in an early education services	1.60	1.01-2.52
I look for developmental milestones my child should be reaching in terms of how he plays, acts, speaks, and learns.[e]		
Strongly agree or agree (Agree)	31.5	7.41-134.4
I have heard of the Learn the Signs. Act Early." Campaign.[e]		
Strongly agree or agree (Agree)	1.52	.9532.42

Note: OR, odds ratio from the simple logistic regression model. Early intervention behavior is defined as the respondent asking their doctor for information about how their child should play, act, speak, or learn. Agreement with the statement was defined as strongly agree or agree, and disagreement with the statement was defined as strongly disagree or disagree on the Likert scale. Model I is univariate, with odds of awareness variables unadjusted for other variables.

[a] Reference group was respondents who answered not important or somewhat important to the survey question.

[b] Reference group was respondents who answered yes to the survey question.

[c] Reference group was respondents who answered incorrectly to the survey question.

[d] Reference group was respondents who answered no to the survey question.

[e] Reference group was respondents who answered strongly disagree or disagree to survey question.

Table 5. Association between early intervention behavior and awareness of autism adjusted for other variables (n=638)

Variable	Model II	
	OR	95% CI
How important of a health problem is autism?		
Very important or important	1.53	.410-5.77
Do you believe the following factors can cause autism?[b]		
Mother's behavior	.675	.420-1.05
Environmental exposures	.999	.659-1.51
Improper parenting	1.59	.741-3.432
Genetics	1.01	.692-1.49
Vaccines	1.29	.748-2.21
Don't Know	.940	.640-1.39
What is the best time to get help for children with autism?[c]		
Before the age of two	1.48	.895-2.43
What behavior most suggest that a child may have autism?[c]		
The child is not using words by age two and loses some words	.914	.617-1.36
If a doctor tells a worried parent to wait and see if a child outgrows a developmental problem, what do you think the parent should do?[d]		
Take their child to another doctor or specialist	1.54	1.06-2.26
Enroll their child in an early education services	1.41	.877-2.27
I look for developmental milestones my child should be reaching in terms of how he plays, acts, speaks, and learns.[e]		
Strongly agree or agree	41.7	8.90-193.3
I have heard of the Learn the Signs. Act Early." Campaign.[e]		
Strongly agree or agree	1.51	.926-2.48

Note: OR, odds ratio from the multiple logistic regression model. Early intervention behavior is defined as the respondent asking their doctor for information about how their child should play, act, speak, or learn. Agreement with the statement was defined as strongly agree and agree, and disagreement with the statement was defined as strongly disagree and disagree on the Likert scale. Model II is multivariate, with odds of awareness variables individually adjusted for other variables. Other variables include gender, age, race, household income, and marital status.

[a] Reference group was respondents who answered not important or somewhat important to the survey question.

[b] Reference group was respondents who answered yes to the survey question.

[c] Reference group was respondents who answered incorrectly to the survey question.

[d] Reference group was respondents who answered no to the survey question.

[e] Reference group was respondents who answered strongly disagree or disagree to survey question.

Merged 2004 and 2006 data were used to analyze differences in early intervention behavior in 2004 versus 2006. There was a slight increase in early intervention behavior in 2006, however the difference was not statistically significant (p=.509).

Table 6. A comparison of variables that measure early intervention behavior in 2004 versus 2006 (n=905)

Survey questions measuring awareness	**YR2004**	**YR2006**	
	%	%	p-value
During my child's last well child visit, I asked for information about how my child plays, acts, speaks, or learns?			
Agree	45.8	48.3	.509

Note: Agreement with the statement was defined as strongly agree and agree, and disagreement with the statement was defined as strongly disagree and disagree on the Likert scale.

CHAPTER V
DISCUSSION

Autism, a serious developmental disability, is on the rise (National Institute of Mental Health, 2007). There is no known cure for autism; however, early intervention of the condition can give a child hope for reaching his or her full potential (Centers for Disease Control and Prevention, 2007a). Although there have been many studies measuring awareness and behavior change due to health promotion campaigns, there are few studies that have described the impact of autism awareness campaigns on behavior (Rogers, 1996).

There were two main findings for this study: 1) there is a statistically significant difference in awareness of autism of those surveyed before the campaign launch and those surveyed two years post-campaign launch, and 2) although some variables that measured awareness showed association with variables that measured early intervention behavior, the majority of the variables showed no statistically significant association.

More participants believed that autism is an important health problem in 2006. There was close to a 10% increase in respondents who recognized the magnitude of the health issue. Understanding the respondents' mental processes regarding autism helps predict influence on adult early intervention behavior. However, when comparing participants who thought autism was an important health problem to early intervention behavior, results did not indicate a significant association. This leads to a possibility that in this study perception and behavior are associated, but the missing factor of intention can have a significant impact on the adoption of early intervention behavior (Guo *et al.*, 2006).

There were no significant differences between 2004 and 2006 of what respondents believed can cause autism. There is no concrete evidence of what exactly can cause autism. Research indicates that there may be multiple causes of autism including interaction of genetic and environmental factors; however, the exact cause is still unknown (Centers for Disease Control and Prevention, 2007a). Although it is not a key objective of the campaign, it is crucial to have a comprehensive understanding of the health problem in order to consider changing behavior (Herek *et al.*, 2002). There was no significant association between awareness of the factors (genetics, environmental exposures, improper parenting, vaccines, and mother's behavior) that cause autism and early intervention behavior in this study. A possible explanation for the insignificant association between the variables could be lack of understanding of the condition (Low et al., 2006).

The best time to get help (developmental screening) for a child with autism is before the age of two. In 2006, more participants were aware of that fact than in 2004. However, even with the increased awareness of the issue, there was still no association between awareness of when a child should seek help and early intervention behavior.

There was a significant association between awareness of what a parent should do if their doctor tells them to wait and see if their child outgrows a developmental problem and early intervention behavior. However, the association cannot be attributable to the campaign necessarily because there was no significant increase in awareness of what a parent should do if their doctor tells them to wait and see if their child outgrows a developmental problem from 2004 and 2006. The campaign may have been the reason respondents were aware of the correct answer to the survey question; however, the results

could also be because of people wanting to learn about autism due to the controversies reported in the news (Fitzpatrick, 2003). Results of this study do not present a strong enough case to attribute the early intervention behavior to the campaign.

The only awareness statement that had a significant increase from 2004 to 2006 and positive association with early intervention behavior was "I look for developmental milestones my child should be reaching in terms of how he plays, acts, speaks, and learns. This topic directly correlates with the campaign's objective "increase awareness of developmental milestones." This finding supported previous studies that claim increased awareness of health issues can lead to positive behavior change (Wutzke *et al.*, 2006).

The one question that was not included in the 2004 survey but was included in the 2006 survey was "I have heard of the Learn the Signs. Act Early." campaign and was based on a Likert scale. There was no significant association between respondents that indicated they strongly agree or agree with the statement and early intervention behavior. If there had been an association however, it would not necessarily have implied association between awareness of autism and early intervention behavior because awareness of the campaign image does not always reflect awareness of campaign content (Miller & Berry, 1998).

The likelihood of engaging in early intervention behavior increased when adjusting for specific awareness and demographic variables. A possible explanation for the differences includes the large number of respondents in the study population who were married. Previous studies have insinuated that caregivers of autistic children report greater stress and depression (Kasari & Sigman, 1997). Marital status research has

suggested that married people have better health and access to health information because they have more material resources, less stress, and more social support (Wyke & Ford, 1992).

There was a very slight increase in early intervention behavior from 2004 to 2006; however, the difference was not significant. Only one question that addressed behavior was included in both the 2004 and 2006 survey: "During my child's last well-child visit, I asked for information about how my child plays, acts, speaks, or learns." This question addressed the campaign objective: increase parent provider dialogue. However, there were no survey questions addressing the objective of increasing referrals for developmental screening. This objective also measures early intervention behavior. Therefore, we cannot assume that there was no change in early intervention behavior from 2004 to 2006.

Limitations

There are several limitations in the interpretation of results from this study. In the 2004 baseline survey, six questions related to autism. Porter Novelli added more questions in the re-contact survey a few months after the 2004 baseline survey was distributed. The re-contact data was then merged with the 2004 baseline survey data to generate the 2004 baseline survey. In the 2006 survey, the original six questions from the 2004 survey were included; however, a few questions from the re-contact survey were omitted. One question was added in the 2006 survey: "I have heard of the Centers for Disease Control and Prevention's Campaign – Learn the Signs. Act Early." Only the questions included in all three surveys and the extra question from 2006 could be

analyzed in this study. The questions in the 2004 baseline survey that were not included in the 2006 survey could have possibly revealed important information.

Both surveys had a large sample size that included over 4000 participants allowing for the assumption of a normal distribution and less chances for skewed results. The population was then stratified to include only parents with children age four or younger. In 2004, parents with children age four or younger were sent the re-contact survey with the additional autism questions. Not all individuals that were contacted returned the re-contact survey. This reduced the number of participants who completed both the original survey and the re-contact survey. In 2004 there were 267 respondents who had a child age four or younger that completed both the original and re-contact survey. In 2006, there were 638 respondents of interest, more than double the amount in 2004. The significant difference in sample sizes between the two study populations acts as a limitation when comparing the two years.

Additionally, three of the questions that were analyzed in the study were based on a Likert scale. Often when questions are based on a Likert scale, central tendency creates a concern for systematic errors. Participants can be been reluctant in giving extreme scores and prefer answering in a neutral manner. Also, as fore mentioned, three of the questions were based on a Likert scale; however, the remaining questions had different formats. Some questions were structured so that the respondent could give only one answer. Other questions allowed for more than one answer. The various formatting for the survey questions made it difficult to compare answers overall.

This study was a cross sectional study therefore directionality of the associations cannot be clearly determined. Respondents who answered survey questions in 2004 were not necessarily the same participants who completed the survey in 2006. A cohort study would more accurately establish association between awareness and early intervention behavior.

Additionally, *HealthStyles* is a consumer survey and not an academic survey. The primary use for the data is not for academic research. Because of this reason, no reliability or validity testing was performed on the data. HealthStyles provides a comprehensive overview of health beliefs. The CDC is able to evaluate a multitude of their health promotion campaigns with this one survey. Using this survey proves to be more cost beneficial but not necessarily the best scientific evaluation method.

Since questions included in *HealthStyles* are part of a consumer market database, questions can be added or deleted every year. Each question must be purchased to be included in the survey; therefore, funding limitations affect the included questions. Due to these restrictions, only a few questions relating to autism and the LTSAE campaign are included each year. Not all of the objectives for the campaign were addressed through the analysis of the survey data. Few variables measured early intervention. The campaign objective: "increase referrals for developmental screening" is not addressed in any of the survey questions. As mentioned before, only one awareness variable indicated increased awareness from 2004 to 2006 and was significantly associated with early intervention behavior in 2004. Therefore, it is possible that positive effects of the campaign may have gone undetected.

LTSAE utilizes various modes of dissemination. Written text (e.g., fact sheets, information cards, print advertising, posters, E-cards, etc.) is used heavily to disseminate campaign messages and resources. Dissemination is defined as "an active approach for knowledge transfer from the resource system to the user system (Glanz *et al.*, 1997)." Dissemination strategies involve choosing the appropriate communication channels and systems to diffuse messages to the target audience. Adoption of messages is a key element of dissemination strategies. Adoption involves actual uptake of the program by the target audience (Glanz et al., 1997). In the case of LTSAE, adoption would involve processing the knowledge as well as engaging in early intervention behavior. Although a multitude of channels were used to account for frequency of exposure, there was no evidence that parents actually read or used the materials they received.

Recommendations

The purpose of this study is to evaluate the effectiveness of CDC's public health autism awareness campaign "Learn the Signs. Act Early." on early intervention behavior in adults with children age four or younger. Results indicated that there was a difference in the level of awareness pre-campaign launch and two years post campaign launch regarding certain issues; however, the association between awareness and early intervention behavior was minimal. Evaluation that is more comprehensive is crucial to determine if these results are in fact is true. If proven true, then further research needs to be conducted to determine possible reasons adults have trouble moving to the action stage of the transtheoretical model. Ajzen and Fishbein's theory of reasoned action provided the framework for the COTM campaign in which they recognized a series of

causal variables from messaging to behavior change: exposure > awareness > knowledge > intention > behavior change, intention being the most important (Craig et al., 2006). The LTSAE campaign incorporates the series of causal variables as well. Investigating the variable of intention would allow us to gain a better understanding of why many of the awareness variables were not associated with early intervention behavior. The CDC and Porter Novelli could add a survey question that addresses intention to change behavior in the 2007 survey.

The LTSAE campaign attempts to increase self-efficacy by providing the target audience with information about developmental milestones their child should be reaching so they themselves can spot the early signs of autism. The educational resources provided to the target audience provide information to address this objective; however, the resources lack sufficient information for the course of action the parent should undergo if they do suspect a developmental disability. The campaign recommends that the parent consult a doctor. Specific guidelines that coach the parents through a consultation with the doctor could prove to help instigate early intervention behavior. Guidelines would increase the parent's self-efficacy empowering them to address the developmental disorder at an early stage.

This particular study assessed awareness and behavior of parents with at least one child age four or younger. *HealthStyles* as a whole provides information about a nationwide population of adults 18+. The survey was an extensive questionnaire (over 100 questions) that addressed numerous health topics. Another recommendation would be to compare the perception of autism and early intervention behavior between the entire *HealthStyles* database and the stratified study population used in this study. Other

HealthStyles questions that investigate overall health could also be analyzed. For example, *HealthStyles* asks general health questions such as to how often participants visit their physician. Answers to this question could be compared to autism specific questions and the analysis could provide valuable information to help strengthen and modify the campaign.

Currently, the LTSAE is designed to address three target audiences: parents with children age four or younger, health care professionals, and daycare providers. To create a more tailored campaign, each of the target audiences could be further broken down by audience and demographic characteristics. All campaign resources are currently available in both English in Spanish; however, they are not tailored by literacy level. Campaign messages could be tailored to reach parents with different socioeconomic statuses. In addition, further research on the specific demographic variables that had a bearing on the association between awareness and behavior could provide valuable information.

LTSAE utilizes various mediums for information dissemination. Identifying which campaign methods and distribution channels were most effective could be cost beneficial and serve as an important planning tool. Autism has been highly visible and often controversial in the media. Answers to the survey questions could be results of information learned through the campaign or other means. Identifying the channels through which individuals learn about autism could possibly have a significant impact on survey answers. An additional survey question or other sources of information that addresses how participants were exposed to the campaign could help analyze this issue.

In addition to determining how participants are exposed to the campaign, adoption to the campaign could also be measured. This would allow campaign planners to analyze why parents are not engaging in early intervention activity at the desired level. Results of this study would determine if the modes of dissemination that rely solely on the target audience reading campaign materials is in fact effective in increasing awareness and instigating early intervention behavior. The campaign could be modified to be more effective and cost beneficial.

As mentioned earlier, the survey questions in *HealthStyles* did not fully address all of the campaign's objectives. Existing questions need to be modified or additional questions should be added to provide a more comprehensive evaluation. Further research needs to be conducted monitoring referrals for early intervention services. Currently, no survey question measures this objective. An additional question or separate study would measure the difference in referral frequency before campaign launch and mid-campaign launch. The CDC and Porter Novelli could also create a specifically targeted survey separate from *HealthStyles* focused specifically on the campaign. This would allow data to be more customized and objective oriented. In addition, creating a synchronized timeline with the transtheoretical model would help establish a guide for when objectives need to be fulfilled and would help the campaign recognize if it is in fact meeting its goals.

Conclusion

Autism is a serious developmental disorder. Although the condition is incurable, it can be controlled to provide the child with a fuller lifestyle. Early intervention is a child's best hope for reaching his or her full potential. While results of this study show

improvements in awareness of autism issues, the results also demonstrate the minimal association between awareness and early intervention behavior. There are a number of reasons a campaign may not have the strong impact desired. In this study, we first recognize that the survey evaluation may not be sufficient in demonstrating the actual impact of the campaign. The variables explored in the survey do not measure all of the objectives outlined in the program's plan. LTSAE may or may not be fulfilling all of its objectives but without a more comprehensive evaluation, evaluation results are incomplete. Secondly, the campaign relies heavily on dissemination of written educational materials. While audience reach can be measured by the volume of materials that have been distributed, we are unaware if the resources are actually read or used making it difficult to measure adoption of the campaign. Further research efforts are essential determine the effectiveness of LTSAE in order to modify the campaign and its evaluation methods. Only then is it possible to target the issues necessary to instigate early intervention behavior. Continuous research on behavioral and social sciences has the potential to advance public health efforts to change behavior in ways that will make us a considerably smarter and healthier nation.

REFERENCES

Alcalay, R. (1983). The impact of mass communication campaigns in the health field. *Social Science and Medicine, 17*(2), 87-94.

Autism Society of America. (2007). Autism definition. Retrieved January 20, 2007, from http://www.autism-society.org/site/PageServer?pagename=about_whatis_home

Autism Speaks. (2007). What is autism? An overview. Retrieved January 12, 2007, 2007, from http://www.autismspeaks.org/whatisit/index.php

Baker, R., Donald, A., & Dunning, M. (1999). Getting evidence into practice. *Effective Health Care, 5*(1), 1-16.

Bertrand, J. T., Reilly, K. O., Denison, J., Anhang, R., & Sweat, M. (2006). Systematic review of the effectiveness of mass communication programs to change HIV/AIDS-related behaviors in developing countries. *Health Education Research, 21*(4), 567-597.

Brown, L., Macintyre, K., & Trujillo, L. (2003). Interventions to reduce HIV/AIDS stigma: What have we learned? *AIDS Education and Prevention, 15*(1), 49.

Brown, W. (2006). Can social marketing approaches change community attitudes towards leprosy? *Leprosy Review, 77*(2), 89-98.

Cartagena, R., Veugelers, P., Kipp, W., Magigav, K., & Laing, L. (2006). Effectiveness of an hiv prevention program for secondary school students in Mongolia. *Journal of Adolescent Health, 39*(6), 925-939.

Centers for Disease Control and Prevention. (2007a). Autism: Topic home. Retrieved January 15, 2007, from http://www.cdc.gov/ncbddd/autism/index.htm

Centers for Disease Control and Prevention. (2007b). Developmental disabilities. Retrieved February 1, 2007, from http://www.cdc.gov/ncbddd/dd/default.htm

Centers for Disease Control and Prevention. (2007c). "Learn the Signs. Act early." Retrieved January 3, 2007, from http://www.cdc.gov/ncbddd/autism/ActEarly

Centers for Disease Control and Prevention. (2007d). Communication at CDC. Retrieved April 1, 2007, from http://www.cdc.gov/communication/

Craig, C. L., Tudor-Locke, C., & Bauman, A. (2006). Twelve-month effects of Canada on the move: A population-wide campaign to promote pedometer use and walking. *Health Education Research, 10*(3).

Curry, S. J., Kristal, A. R., & Bowen, D. J. (1992). An application of the stage model of behavior change to dietary fat reduction. *Health Education Research, 7*(1), 97-105.

Edelston, S. (2007). Center for the study of autism: Overview of autism. Retrieved February 1, 2007, from http://www.autism.org/overview.html

Farrelly, M., Davis, K., Haviland, M., Healton, C., & Messeri, P. (2005). Evidence of dose-response relationship between 'Truth' antismoking ads and youth smoking prevalence. *American Journal of Public Health, 95*(3), 425-431.

Fife, B. L., & Wright, E. R. (2000). The dimensionality of stigma: A comparison of its impact on the self of persons with HIV/AIDS and cancer. *Journal of Health and Social Behavior, 41*(1), 50-67.

Fishbein, M., & Middlestadt, S. E. (1987). Using the theory of reasoned action to develop educational interventions: Applications to illicit drug use. *Health Education Research, 2*(4), 361-371.

Fitzpatrick, M. (2003). *MMR and autism: What parents need to know*: Routledge.

Glanz, K., Lewis, F. M., & Rimer, B. K. (1997). *Health behavior and health education* (2nd ed.): Jossey-Bass Publishers.

Green, L. W., & Kreuter, M. W. (2005). *Health program planning: An educational and ecological approach* (Fourth ed.). New York: The McGraww-Hill Companies, Inc.

Grimshaw, J. M., Eccles, M. P., Walker, A. E., & Thomas, R. E. (2002). Changing physicians' behavior: What works and thoughts on getting more things to work. *The Journal of Continuing Education in the Health Professions, 22*, 237-243.

Herek, G. M., P., J., Widaman, & F., K. (2002). HIV-related stigma and knowledge in the United States. *American Journal of Public Health, 92*(3).

Guo, Q., Johnson, C. A., Unger, J. B., Lee, L., Xie, B., Chou, C.-P., et al. (2006). Utility of the theory of reasoned action and theory of planned behavior for predicting Chinese adolescent smoking. *Addictive Behaviors*.

Hornik, R. C. (2002). *Public health communication: Evidence for behavior change* (Fourth ed.). Mahwaw: Lawrence Erlbaum Associates, Inc.

Kasari, C., & Sigman, M. (1997). Linking parental perceptions to interaction in young children with autism. *Journal of Autism and Developmental Disorders, 27*(1), 39-54.

Kassem, N. O., Lee, J. W., Modeste, N. N., & Johnston, P. K. (2003). Understanding soft drink consumption among female adolescents using the theory of planned behavior. *Health Education Research, 18*(3), 279-291.

Klepp, K.-I., & Wilhelmsen, B. U. (1993). Nutrition education in junior high schools: Incorporating behavior change strategies into home economics courses. *Health Education Research, 8*(4), 547-554.

Kreuter, M. W., Lezin, N. A., Kreuter, M. W., & Green, L. W. (2003). *Community health promotion ideas that work* (Second ed.). London: Jones and Bartlett Publishers International.

Kreuter, M. W., & Strecher, V. J. (1996). Do tailored behavior change messages enhance the effectiveness of health risk appraisal? Results from a randomized trial. *Health Education Research, 11*(1), 97-105.

Longue, E., Sutton, K., Jarjoura, D., & Smucker, W. (2000). Obesity management in primary care: Assessment of readiness to change among 284 family practice patients. *American Board Family Practice, 13*(3), 164-171.

Low, B. Y., Liong, M. L., Yuen, K. H., Chong, W. L., Chee, C., Leong, W. S., et al. (2006). Study of prevalence, treatment-seeking behavior, and risk factors of women with lower urinary tract symptoms in northern Malaysia. *Journal of Urology, 68*(4), 751-758.

Miller, S., & Berry, L. (1998). Brand salience versus brand image: Two theories of advertising effectiveness. *Journal of Advertising Research, 38*.

Montoya, Kent, Rotblatt, H., McCright, J., Kerndt, P., & Klausner, J. (2005). Social marketing campaign significantly associated with increases in syphilis testing among gay and bisexual men in San Francisco. *Sexual Transmission, 32*(7), 395-399.

Nader, P., Sellers, D., Johnson, C., Perry, C., Stone, E., Cook, K., et al. (1996). The effect of adult participation in a school-based family intervention to improve children's diet and physical activity: The child and adolescent trial for cardiovascular health. *Preventive Medicine, 25*(4), 455-464.

Napolitano, Lerch, Papandonatos, G., & Marcus, B. (2006). Worksite and communications-based promotion of local walking path. *Journal of Community Health, 31*(4), 326-342.

National Institute of Mental Health. (2007). Autism spectrum disorders (pervasive developmental disorders). Retrieved January 30, 2007, from http://www.nimh.nih.gov/publicat/autism.cfm

Newschaffer, C. J., Falb, M. D., & Gurney, J. G. (2005). National autism prevalence trends from United States special education data national autism prevalence trends from United States special education data. *Pediatrics, 115*(3), 227-282.

Ockene, I. S., Hebert, J. R., Ockene, J. K., Saperia, G. M., Stanek, E., Nicolosi, R., et al. (1999). Effect of physician-delivered nutrition counseling training and an office-support program on saturated fat intake, weight, and serum lipid measurements in a hyperlipidemic population. *Archives of Internal Medicine, 159*(7).

Pandian, J. D., Santosh, D., Kumar, T. S., Sarma, P. S., & Radhakrishnan, K. (2006). High school students' knowledge, attitude, and practice with respect to epilepsy in Kerala, southern India. *Journal of Epilepsy and Behavior, 9*(3), 492-497.

Perry, C., Luepker, R., Murray, D., Kurth, C., Mullis, R., Crockett, S., et al. (1998). Parent involvement with children's health promotion: The Minnesota home team. *American Journal of Public Health, 78*(9), 1156-1161.

Porter Novelli. (2004a). *Autism campaign logic model*.

Porter Novelli. (2004b). *Early childhood development nation campaign: Findings from formative research*. Atlanta: Centers for Disease Control and Prevention.

Porter Novelli. (2005). *"learn the signs. Act early." a campaign to help every child reach his or her full potential* (Overview Report): Porter Novelli/National Center on Birth Defects and Developmental Disabilities.

Prochaska, J. O., & Velicer, W. F. (1998). Behavior change: The transtheoretical model of health behavior change. *American Journal of Health Promotion, 12*(1), 38-48.

Osborne, R. H., Buchbinder, R., & Ackerman, I. N. (2006). Can a disease-specific education program augment self-management skills and improve health-related quality of life in people with hip or knee osteoarthritis. *Musculoskeletal Disorders, 7*(90), 1471-1487.

Rollnick, S., & Mason, P. (1999). *Health behavior change: A guide for practitioners*: Elsevier Health Sciences.

Rogers, S. (1996). Early intervention in autism. *Journal of Autism and Developmental Disorders, 26*(2), 243-250.

Rydell, R. J., & McConell, A. R. (2006). Understanding implicit and explicit attitude change: A systems of reasoning analysis. *Journal of Personality and Social Psychology, 91*(6), 995-1008.

Siero, F. W., Diem, M. T. v., Voorrips, R., & Willemsen, M. C. (2004). Periconceptional motion: An exploratory study of determinants of change in smoking behavior among women in the fertile age range. *Health Education Research, 19*(4), 418-429.

Sly, D., Heald, G., & Ray, S. (2001). The Florida "truth" Anti-tobacco media evaluation: Design, first year results, and implications for planning future state media evaluations. *Tobacco Control, 10*(1), 9-15.

Sood, S., & Nambiar, D. (2006). Comparative cost-effectiveness of the components of a behavior change communication campaign on HIV/AIDS in North India. *Journal of Health Communication, 11*(Supplement 2), 143-162.

Sorensen, G., Hunt, M. K., Cohen, N., Stoddard, A., Stein, E., Phillips, J., et al. (1998). Worksite and family education for dietary change: The Treatwell 5-a-day program. *Health Education Research, 13*(4), 577-591.

Tan, X., Li, S., Wang, C., Chen, X., & Wu, X. (2004). Severe acute respiratory syndrome epidemic and change of people's health behavior in China. *Health Education Research, 19*(5), 576-580.

Thompson, T. L. (2003). *Handbook of health communication*. Mahwah: Lawrence Erlbaum Associates, Inc.

Tu, K., & Davis, D. (2002). Can we alter physician behavior by education methods? Lessons learned from studies of the management and follow-up of hypertension. *The Journal of Continuing Education in the Health Professions, 22*, 11-22.

Walker, A. E., Grimshaw, J., Johnston, M., Pitts, N., Steen, N., & Eccles, M. (2003). Prime - process modeling in implementation research: Selecting a theoretical basis for interventions to change clinical practice. *BMC Health Services Research, 3*(22), 1-12.

Weeks, S. (2001). Evaluating health promotion, practice and methods. *Health Education Research, 16*(3), 383-384.

Wutzke, S., Artist, M., Kehoe, Flethcher, Mackson, & Weekes. (2006). Evaluation of a national programme to reduce inappropriate use of antibiotics for upper respiratory tract infections: Effects on consumer awareness, beliefs, attitudes and behaviour in Australia. *Health Promotion International*.

Wyke, & Ford. (1992). Competing explanations for associations between marital status and health. *Social Science and Medicine, 34*(5).

Yzer, M. C., Siero, F. W., & Buunk, B. P. (2000). Can public health campaigns effectively change psychological determinants of safer sex? An evaluation of three Dutch campaigns. *Health Education Research, 15*(3), 339-352.