Interventions to modify television viewing behavior of children: a review, meta-analysis, and key-informant interviews

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INTERVENTIONS TO MODIFY TELEVISION VIEWING BEHAVIOR OF CHILDREN: A REVIEW, META-ANALYSIS, AND KEY-INFORMANT INTERVIEWS

by

Dayna Maureen Maniccia

A Dissertation
Submitted to the University at Albany, State University of New York
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Doctor of Public Health

School of Public Health
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INTERVENTIONS TO MODIFY TELEVISION VIEWING BEHAVIOR
OF CHILDREN: A REVIEW, META-ANALYSIS,
AND KEY-INFORMANT INTERVIEWS

by

Dayna Maureen Maniccia

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ACKNOWLEDGEMENTS

Too many people have supported me through this process for me to name each one individually but I would be remiss if I did not acknowledge my family and friends for their support and encouragement. I am especially grateful for the support and encouragement from my husband, Mark Gundrum, and my parents, Cesare and Victoria Maniccia – to them, I dedicate this dissertation.
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ABSTRACT

Excessive screen time and childhood obesity are two associated public health concerns. Several interventions to modify children’s screen time exist. To date, no systematic review of these interventions has been conducted. This dissertation identified and summarized interventions to modify children’s screen time. Suggestions for future work are provided.

Study 1 was a systematic review and meta-analysis of documents describing interventions that modify children’s screen time. A random effects model was used to calculate effect sizes and associated 95% confidence intervals. Heterogeneity tests, moderator analyses, assessments of bias, and sensitivity analyses were also conducted.

The systematic search identified 3002 documents; 33 were eligible for inclusion and 29 were included in the analyses. The overall Standard Mean Difference (-0.148 (-0.224, -0.071)) indicated that the interventions were associated with small but significant reductions in children’s screen time. Although heterogeneity was present in the sample, no moderators were identified. The results were robust; the funnel plot and trim-and-fill methods identified few missing studies, which, if included, would not alter the overall conclusion.

Study 2 utilized a web-based survey design to collect information about programs to modify children’s screen time that were developed/implemented by state departments or agencies. Information about the programs and barriers to program development/implementation was collected and summarized.

Forty-seven individuals from 36 states completed the survey. Roughly half indicated their agency had developed/implemented a program to modify children’s screen
time. Several of the programs were theory-based and most were developed by the respondents’ agency with federal government funding. Lack of funding and time were the most frequently cited barriers. As anticipated, few programs had been evaluated.

It was hypothesized that the systematic literature search would identify small-scale interventions with statistically significant positive results and that the survey of state personnel would identify universal interventions. Overall, the hypothesis was supported.

In summary, future interventions should 1) target both the family and child, 2) be enjoyable for children, 3) include information provision, 4) target high risk groups, and 5) focus on screen time related behaviors. Researchers should develop and evaluate evidence-based programs and program materials should be incorporated into existing structures to facilitate sustainability.
CHAPTER 1
INTRODUCTION

Childhood Overweight and Obesity

Obesity, one of the leading health indicators in *Health People 2010* (U.S. Department of Health and Human Services, 2001), is a major public health problem. It is estimated that elevated BMI in children is associated with more than $14 billion in additional prescription drug, emergency room, and outpatient visits costs compared to children that were normal or under weight (Trasande & Chatterjee, 2009). Between 2001 and 2005, there was an almost two fold increase in the number of hospitalizations for which obesity was listed as a diagnosis among children ages 2 – 19 years. Similarly, hospitalization related charges associated with any diagnosis of obesity increased from $126 million to $278 million during the same time period (Trasande, Liu, Fryer, & Weitzman, 2009). It is not surprising that there is an increasing trend in hospitalization with a primary or secondary diagnosis of obesity among children (Trasande, et al., 2009) given the increase in weight status of children.

The prevalence of overweight among children (persons younger than 19 years of age) has been increasing for more than 20 years (American Academy of Pediatrics - Committee on Nutrition, 2003; Coon & Tucker, 2002; Deckelbaum & Williams, 2001; National Center for Health Statistics, 2007; U.S. Department of Health and Human Services, 2001). In 2003-2004, between 17% and 19% of children ages 2 to 19 years were overweight (National Center for Health Statistics, 2007). More alarming is that increases in overweight have occurred in a skewed fashion, the heaviest youth are
becoming even heavier (Ebbeling, Pawlak, & Ludwig, 2002). Additionally, the burden of obesity is disproportionately distributed across race/ethnicity. Non-Hispanic black children have the greatest proportion of overweight (20%); the lowest proportion is among non-Hispanic white children (16%) (Ogden et al., 2006).

Childhood overweight is associated with an overall decreased health-related quality of life (Schwimmer, Burwinkle, & Varni, 2003). Overweight youth are at risk for psychological problems such as negative self-esteem, withdrawal, depression, anxiety, feelings of rejection, social stigmatization, discrimination, and poor body image (Deckelbaum & Williams, 2001, U.S. Department of Health and Human Services, 2001 #37; Eisenberg, Neumark-Sztainer, & Story, 2003; Sjöberg, Nilsson, & Leppert, 2005; Strumpf, 2004). Overweight youth experience psychosocial consequences (Anderson, 2004; Ebbeling, et al., 2002). They are often mistaken for older individuals and expected to behave in a more adult manner than they are capable leading to frustration and a sense of failure. They are often socially isolated from peers, teased by family and friends, experience bullying behavior by other children, and stereotyped as unhealthy, academically unsuccessful, socially inept, unhygienic, and lazy (Dietz, 1998; Ebbeling, et al., 2002; Eisenberg, et al., 2003; Sjöberg, et al., 2005; Strumpf, 2004). Furthermore, overweight youth exhibit increased cardiovascular risk factors, type 2 diabetes, pulmonary complications (Anderson, 2004; Ebbeling, et al., 2002). They are at risk for sleep, gastrointestinal, and respiratory problems, endocrine, orthopedic, and nervous system disorders, and skin conditions (Barlow & Expert Committee, 2007).

In addition, to the immediate consequences of childhood overweight, excessive weight during childhood has long term implication. Body mass index in childhood is
predictive of BMI in adulthood, overweight children are at increased risk of becoming overweight adults (American Academy of Pediatrics - Committee on Nutrition, 2003; Deckelbaum & Williams, 2001; Dietz, 1998; 2004; U.S. Department of Health and Human Services, 2001; Viner & Cole, 2005; Wright, Parker, Lamont, & Craft, 2001). As adults, overweight adolescents have fewer years of advanced education, lower family income, and lower rates of marriage (Dietz, 1998). Childhood overweight is associated with lower levels of achievement as an adult and increased risk of adult morbidity and mortality (American Academy of Pediatrics - Committee on Nutrition, 2003; Deckelbaum & Williams, 2001; Dietz, 1998; Lowry, Wechsler, Galuska, Fulton, & Kann, 2002; van Dam, Willett, Manson, & Hu, 2006). Increased risk of CHD in adulthood has been shown to be associated with high BMI during childhood (Baker, Olsen, & Sorensen, 2007) and overweight during adolescence has also been associated with increased risk of premature death in women (van Dam, et al., 2006).

Factors Impacting Weight Status

Weight is impacted by the interaction of genetic, metabolic, behavioral, environmental, cultural, psychological, and socioeconomic factors (American Academy of Pediatrics - Committee on Nutrition, 2003; Davison & Birch, 2001; U.S. Department of Health and Human Services, 2001). Additionally, child weight status is related to community, demographic, and societal characteristics such as ethnicity, SES, crime and safety, parenting styles and family characteristics, peer and sibling interactions, and individual child characteristics such as sedentary behavior and physical activity (Davison & Birch, 2001).
Although many factors are associated with childhood weight status (Figure 1) this work will focus on children’s sedentary behavior, more specifically, children’s screen time. Persons between the ages of 6 and 19 are sedentary roughly 7 hours per day (Matthews et al., 2008). Sedentary behaviors have been defined by Pate and colleagues as activities that do not increase energy expenditure substantially above the resting level and includes activities such as sleeping, sitting, lying down, and watching television and other forms of screen-based entertainment (Pate, O’Neill, & Lobelo, 2008).

In April 2006 the Centers for Disease Control and Prevention convened an eleven member panel of experts in the fields of public health, public policy, pediatrics, nutrition, psychology, sociology, and communication to examine the association between television viewing and weight (Jordan & Robinson, 2008). The panel reviewed the existing evidence and found support for the relationship between television viewing and overweight. This conclusion is consistent with results from a meta-analysis of research studies conducted a number of years earlier. In this work, Marshall and colleagues concluded that although small, there is a statistically significant link between TV viewing and body fatness (Marshall, Biddle, Gorely, Cameron, & Murdey, 2004).

Multiple mechanisms have been proposed to explain the influence of television viewing on weight gain including: 1) displacing physical activity; 2) increasing energy intake by influencing what and how much children eat while watching television; 3) decreasing resting metabolic rate due to the sedentary nature of television viewing and thus promoting weight gain; and 4) affecting what and how much children eat at other times due to influences from commercials and programming (Baranowski, 1997; Coon & Tucker, 2002; Ebbeling, et al., 2002; Robinson, 2001).
Children’s Media Use

Children’s exposure to screen media (TV, video/DVD, computers, video games) is ubiquitous. In the United States, the majority of children live in a home with at least one, a VCR or DVD player, a video game player, and a computer (Rideout & Hamel, 2006; Roberts, Foehr, & Rideout, 2005). Not surprisingly, the majority of children’s sedentary waking time is spent with media (Matthews, et al., 2008).

The average 8 to 18 year old child spends more than 7.5 hours with media (including roughly 4.5 hours of television) per day (Rideout, Foehr, & Roberts, 2010). Furthermore, 25% of youth aged 8 to 16 years watch more than four hours of television per day (American Academy of Pediatrics - Committee on Nutrition, 2003). Even very young children spend time with screen media. Roughly 30% of children under the age of six years use a computer several times a week, and 13% and 8% play console and handheld video games respectively (Rideout & Hamel, 2006). A recent study found that approximately two thirds of a national sample of three year old children watch approximately three hours of television per day (Manganello & Taylor, 2009). Yet, overall, the total television viewing of children has remained relatively stable for nearly 50 years (Marshall, Gorely, & Biddle, 2006) and the appearance of new media has not displaced television viewing – children still spend the majority of their time watching television (Roberts & Foehr, 2008).

The American Academy of Pediatrics (AAP) recommends restrictions in children’s screen time (screen time includes television, videos, computers, and videogames). In particular, the AAP recommends no screen time, for children under the age of two years and no more than two hours per day for children over two years of age.
(American Academy of Pediatrics - Committee on Nutrition, 2003; American Academy of Pediatrics Council on Communications and Media, 2009). As noted above, the majority of children exceed this recommendation. A second recommendation of the AAP is that TVs are not placed in children’s bedrooms (American Academy of Pediatrics - Committee on Nutrition, 2003; American Academy of Pediatrics Committee on Public Education, 2001). Yet 33% of children ages six years and younger (Rideout & Hamel, 2006) and 71% of children between the ages of 8 and 18 years (Rideout, et al., 2010) have televisions in their bedrooms. Children with TVs in their bedrooms watch more TV compared to children without TVs in their bedrooms (Coon & Tucker, 2002; Rideout & Hamel, 2006; Rideout, et al., 2010). Television in the bedroom is also associated with higher BMI, waist circumference, and body fat throughout adolescence for boys but not girls (Delmas et al., 2007). In addition to increasing children’s risk of excessive TV viewing, placing TVs in children’s bedrooms also reduces parents’ ability to monitor viewing content. In sum, many US children and adolescents watch excessive amounts of TV. This pattern is of particular concern given the noted negative effects of excessive TV viewing on children’s mental and physical health outcomes.

Implications of Excessive Media Use

Concerns surrounding media and children have been present for more than 100 years (Wartella & Robb, 2008). Because individuals adopt beliefs about reality that are consistent with what they view (Bell, Berger, Cassady, & Townsend, 2005; Shrum, 1999) and children’s lack of life experiences upon which to base their beliefs (Bell, et al., 2005) and their inability to differentiate between reality and fantasy (Byrd-Bredbenner,
Finckenor, & Grasso, 2003; Wilson et al., 2002) make them more susceptible to the influence media. Exposure to media (defined as television, movie, internet electronic/videogames, magazines, and music excluding advertising, journalism, and public service announcements) is associated with several negative health outcomes. In addition to increased risk of obesity media use is associated with increased and tobacco, drug, alcohol use, decreased academic achievement and earlier sexual behavior and weakly associated with attention deficit disorder with hyperactivity (Nunez-Smith et al., 2008). Heavy media use is associated with lower grades (Rideout, et al., 2010) and can impact children’s perceptions of what is normal. Images of females in the media are often highly sexualized and shape young girls’ beliefs about what is the norm or what is ideal. The sexualization of females by the media can also have a negative effect on males by creating unrealistic expectations about an ideal partner and inhibiting their ability to maintain intimacy or interact intellectually with females (American Psychological Association Washington DC., 2007).

One specific category of media is screen media (television, video/DVD, computer, and video/computer games). Use of screen media is associated with increased body mass index (Anderson, Economos, & Must, 2008), metabolic syndrome (Mark & Janssen, 2008) and decreased attachment to parents and peers (Richards, McGee, Williams, Welch, & Hancox, 2010). Television a form of screen media, has been the focus of much research. Most of which has focused on TV advertising or prime-time TV content and its impact on children’s and adolescents’ development, socialization, sexual behavior, aggression, physical activity, risk-behaviors, and perception of stereotypes (Barner, 1999; Bell, et al., 2005; Byrd-Bredbenner, et al., 2003; Collins et al., 2004;
Greenberg, Eastin, Hofschire, Lachian, & Brownell, 2003; Hampl et al., 2004; Harrison & Marske, 2005; Henderson & Kelly, 2005; Kennedy, 2000; Lewis & Hill, 1998; Shrum, 1999; Singer & Singer, 2001; Story & Faulkner, 1990; Tirodkar & Jain, 2003; Wallace & Leenders, 2004; Will, Porter, Geller, & DePasquale, 2005; Wilson, et al., 2002; Witt, 2000). More food references occur during television programs than commercials and more than two thirds of the food consumed on prime-time shows are of low nutritional value and eaten as snacks between meals (Coon & Tucker, 2002; Story & Faulkner, 1990). On television, these poor nutritional habits are not shown to have any negative consequences, and the actors on the prime-time shows are mostly thin and beautiful (Coon & Tucker, 2002). Television viewing can impact children’s behavior by glamorizing and over-representing unhealthy lifestyle choices without consequences (Hampl, et al., 2004). Another example is that media exposure to violence and trauma through violence on TV and in video games is associated with violent and aggressive behaviors in youth (Huesmann & Taylor, 2006). Such effects have been observed among children as young as three years of age (Manganello & Taylor, 2009). Exposure to tragedies and disasters on television is associated with post-traumatic stress disorder in children (Joshi, Parr, & Efron, 2008). Excessive TV viewing in general is associated with increased psychological distress (Hamer, Stamatakis, & Mishra, 2009) and getting into trouble, sadness, and boredom (Rideout, et al., 2010) and with poor social-emotional health (Russ, Larson, Franke, & Halfon, 2009). Excessive TV viewing also reduces the occurrence of prosocial behaviors in youth such as the time children spend with parents and siblings, time doing homework, and time engaged in creative (Vandewater, Bickham, & Lee, 2006). Additionally, Excessive TV viewing is associated with a number of
negative health behaviors and physical health outcomes including irregular sleep (Thompson & Christakis, 2005) and poor oral (Russ, et al., 2009).

Recently, the impact of television viewing on nutritional habits in children has been of particular interest (Coon & Tucker, 2002; Ebbeling, et al., 2002; The Henry J. Kaiser Family Foundation, 2004). Television viewing is associated with insufficient consumption of fruits and vegetables (Lowry, et al., 2002) and disordered eating (Harrison, 2000; Moriarty & Harrison, 2008). Research on the topic has shown that exposure to TV advertising is linked with increased preference for the advertised foods (Coon & Tucker, 2002; Ebbeling, et al., 2002; Robinson, Borzekowski, Matheson, & Kraemer, 2007; The Henry J. Kaiser Family Foundation, 2004). Children as young as two years old are able to connect brands seen in stores with images seen on television (Coon & Tucker, 2002). Television advertising increases children’s preference for certain foods – children request and choose products that they have seen advertised at higher rates than products they have not been exposed to through advertising (Coon & Tucker, 2002; Ebbeling, et al., 2002; The Henry J. Kaiser Family Foundation, 2004). Since children begin to develop food preference as young as two years of age (Baranowski, 1997) unhealthy food choices can begin to impact their health early on.

Interventions to Reduce Screen Time Among Children

Overall, results from these studies indicate that excessive screen time among youth is a matter of public health concern. In response to this emerging literature, there has been a rapid expansion of interventions to decrease screen time, especially TV viewing, among children and adolescents. Since the seminal paper by Dietz and
Gortmaker (1985) first linking TV viewing and obesity in adolescents, results from at least 20 interventions have been published. The vast majority of these studies have been published since 2000.

What is clearly lacking at this point is a synthesis of this literature. A frequently mentioned concern of childhood obesity stakeholders is the need for information about evidence based programs to address childhood obesity (McPhillips-Tangum, Torghele, Saartas, & Renahan-White, 2006) (see Table 1 for a description of the information needs of various childhood obesity stakeholder groups). To address one of the needs of these stakeholders, this dissertation identified programs that aim to change children’s screen time (TV, video/DVD, video- and computer-games, and computer use for non-academic purposes) that have been developed and tested in a research setting or on a large scale by state departments or agencies.

Goals of this Dissertation

The primary goal of this dissertation was to identify, summarize, and evaluate interventions that modify children’s screen time and evaluate the effects of the identified interventions. For the purpose of this work, screen time refers to watching TV or videos/DVDs, playing video or computer games, or using a computer for purposes other than school work. The broader behavior of screen time was selected because the AAP recommends limiting children’s total screen time (American Academy of Pediatrics Committee on Public Education, 2001). Three methods were used to reach this goal including a systematic literature review, a meta-analysis, and key informant interviews.
A systematic review is a literature review that follows a set of scientific methods in order to answer a particular question (Petticrew & Roberts, 2006). Systematic reviews aim to comprehensively locate and synthesize research that relates to a question of interest by using organized, transparent, and replicable procedures, (Littell, Corcoran, & Pillai, 2008). Systematic reviews aim to limit systematic error by attempting to identify, appraise, and synthesize all relevant studies (Petticrew & Roberts, 2006). Meta-analyses build on systematic reviews by converting study results into a common metric, and effect size, and statistically combining the effect sizes of all studies identified in the systematic review into a mean estimate of effect across studies (Briss, Dolan Mullen, & Hopkins, 2005). A systematic review of the literature and a meta-analysis of the identified works comprised Study 1 of this dissertation.

Building on the results of Study 1, in Study 2 key informant surveys were used to document state government interventions to reduce screen time in youth, and to identify perceived barriers and facilitators of program development and implementation. In order to collect information about programs that have been developed and/or implemented by state agencies, an internet-based survey of state employees was conducted. A brief (5-10 minute) survey was developed to collect information about characteristics of programs to modify children’s screen time that have been developed and/or implemented by state government agencies or departments. Information collected included program characteristics, development and funding of the program, and potential barriers to program development and implementation.
Hypothesis

It was hypothesized that two main types of interventions would be identified and reviewed including selective or targeted (indicated) interventions and universal interventions (Institute of Medicine Food and Nutrition Board: Committee to Develop Criteria for Evaluating the Outcomes of Approaches to Prevent and Treat Obesity, 1995; "Obesity: preventing and managing the global epidemic. Report of a WHO consultation," 2000). Interventions with a universal orientation focus on a large population, for example TV Turn Off Week, while selective and targeted interventions are directed at a specific audience such as children in daycare settings or persons who exceed television viewing recommendations. It was expected that the systematic literature search would identify primarily targeted and selective interventions with statistically significant positive results given the tendency for such results to be published more frequently (Schulze, 2004). It was also anticipated that the universal interventions would be identified through the surveys of state program personnel.

Summary and Contributions to the Field

To date, no consolidated list of interventions that modify children’s television viewing exist. By providing an overview of programs available, this dissertation can serve as a resource for program personnel to use when identifying and selecting an intervention for use in their organization. Systematic reviews can provided information on promising, understudied topics, reduce repetition of research, and help researchers and funding organization to prioritize goals and set agendas (Briss, Portnoy, Vogel-Taylor, & Zaza, 2005). Having a consolidated list of interventions, information about the
effectiveness of existing interventions and a description common elements across interventions will provide researchers and practitioners with a valuable resource that can be used to direct further research and intervention development.
References


Deckelbaum, R. J., & Williams, C. L. (2001). Childhood obesity: The health issue. *Obesity Research, 9*(Suppl. 4), 239S-243S.


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<td>Federal government</td>
<td>information about which programs are effective in meeting their stated goals and objectives and which strategies have been shown to be successful</td>
</tr>
<tr>
<td>State government</td>
<td>information about program effectiveness and best practices</td>
</tr>
<tr>
<td>Education</td>
<td>more information on program effectiveness (i.e., “what works”)</td>
</tr>
<tr>
<td>Parents and Families</td>
<td>increased information about which programs are effective in preventing obesity; information about what “individual parents can do” as well as information about what “parents can collectively do” to address the childhood obesity problem</td>
</tr>
<tr>
<td>Healthcare Professionals &amp; Organizations</td>
<td>additional information about effective approaches for treating childhood obesity; more information that could help them determine “what works”; information about how to effectively intervene with patients and their families to prevent a child from becoming overweight or prevent the transition from overweight to obese; information on “what was done” in obesity prevention and about “exactly how it was done and who did it”: so that effective programs could be scrutinized to determine whether they would be likely to work in different settings; information about programs that did not work, along with explanations or speculation about why</td>
</tr>
<tr>
<td>Industry</td>
<td>effective ways to communicate with consumers regarding healthy food choices and physical activity; information about what other organizations are doing with regard to obesity prevention</td>
</tr>
<tr>
<td>Media</td>
<td>more information about program effectiveness; a “central resource” or “clearinghouse” that could be accessed by all types of stakeholders to learn about what other organizations are doing and what programs are effective</td>
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<tr>
<td>Community &amp; non-profit organizations</td>
<td>better information about “who’s doing what” and “what’s going on in the trenches”; more information about program effectiveness in reducing childhood obesity; more information to describe “best practices” and enhanced knowledge about how to develop messages and communication strategies that &quot;really work&quot;; a central site or clearinghouse</td>
</tr>
<tr>
<td>Researchers</td>
<td>more information is needed to identify and describe environmental, policy and other factors that are effective in promoting physical activity and healthy eating; improve the availability of information that organizations need related to childhood obesity; information should be “packages” and “readily available”; “short, non-technical summaries” of key research finding on a central website was recommended</td>
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Note: The text in this table was copied in its original form from the Public Health Informatics Institute’s report (McPhillips-Tangum, et al., 2006).
Figure 1: Factors Influencing the Weight Status of Children

Figure based on the PRECEDE Model (Bartholomew, Parcel, Kok, & Gottlieb, 2001) of some of the factors impacting the weight status of children (French, Story, & Jeffery, 2001).
CHAPTER 2

STUDY 1 – INTERVENTIONS TO REDUCE CHILDREN’S SCREEN-TIME:
A META-ANALYSIS

Introduction

Although the American Academy of Pediatrics (AAP) recommends no screen time (television, videos/DVDs, computers, and videogames) for children under the age of two years and no more than two hours per day for children over two years of age (American Academy of Pediatrics - Committee on Nutrition, 2003; American Academy of Pediatrics Council on Communications and Media, 2009) 47% of children ages 2 to 15 years old spend two or more hours per day in screen time (Sisson et al., 2009) the majority of which is spent watching television. Seventy-seven percent of children under the age of six years old watch television every day (Rideout & Hamel, 2006) and more than 25% of youth report watching more than four hours of TV per day (American Academy of Pediatrics - Committee on Nutrition, 2003). Even young children watch TV more than recommended. A recent study found that approximately two thirds of a national sample of three year old children watch roughly three hours per day of television and are exposed to more than five additional hours of indirect (i.e., television on in the background) television per day (Manganello & Taylor, 2009). Also in contradiction of the AAP recommendations, 33% of children ages six years and younger (Rideout & Hamel, 2006) and 71% of children between the ages of 8 and 18 years (Rideout, Foehr, & Roberts, 2010) have televisions in their bedrooms, a characteristic associated with increased viewing (Coon & Tucker, 2002; Rideout & Hamel, 2006; Rideout, et al., 2010).
Given these statistics, it is not surprising that children’s television viewing has been the subject of much research and concern.

Time spent watching television is associated with a number of negative health behaviors and outcomes including overweight (Dennison, Erb, & Jenkins, 2002; Jordan & Robinson, 2008; Lumeng, Rahnama, Appugliese, Kaciroti, & Bradley, 2006; Marshall, Biddle, Gorely, Cameron, & Murdey, 2004), irregular sleep (Thompson & Christakis, 2005), insufficient consumption of fruits and vegetables (Lowry, Wechsler, Galuska, Fulton, & Kann, 2002), and disordered eating (Harrison, 2000; Moriarty & Harrison, 2008). Furthermore, excessive TV viewing has detrimental effects on prosocial behaviors among youth such as time spent with parents and siblings, time doing homework, and time engaged in creative play (Vandewater, Bickham, & Lee, 2006) and is linked with lower grades, getting into trouble, sadness, and boredom (Rideout, et al., 2010).

Additionally, violence on television and in video games is associated with violence and aggression (Huesmann & Taylor, 2006; Manganello & Taylor, 2009) and exposure to tragedies and disasters on television negatively impacts children’s mental health (Joshi, Parr, & Efron, 2008).

Childhood and adolescent television viewing is also associated with negative health outcomes in later life including higher weight, lower cardiorespiratory fitness, increased smoking and elevated cholesterol (Hancox, Milne, & Poulton, 2004). When adolescent comorbidities continue into adulthood, the total length of time during which an impact can be made on long-term health is increased (American Academy of Pediatrics - Committee on Nutrition, 2003; Deckelbaum & Williams, 2001). Men and women who were overweight as adolescents were found to have increased age-specific
morbidity and mortality related to cardiovascular and other chronic diseases. Additionally, adolescent overweight contributes to adult achievement (American Academy of Pediatrics - Committee on Nutrition, 2003; Deckelbaum & Williams, 2001; Dietz, 1998; Lowry, et al., 2002). Overweight adolescents have fewer years of advanced education, and lower family income and rates of marriage as adults (Dietz, 1998).

Although children and television have been the topic of study for many years (Pecora, Murray, & Wartella, 2007), the majority of this research has focused on the impact of TV on children’s behavior, television content, and media policy (Barner, 1999; Bell, Berger, Cassady, & Townsend, 2005; Byrd-Bredbenner, Finckenor, & Grasso, 2003; Calvert & Wilson, 2008; Collins et al., 2004; Greenberg, Eastin, Hofschire, Lachian, & Brownell, 2003; Hampl et al., 2004; Harrison & Marske, 2005; Henderson & Kelly, 2005; Kennedy, 2000; Lewis & Hill, 1998; Preiss, Gayle, Burrell, Allen, & Bryant, 2007; Rich, 2007; Shrum, 1999; Singer & Singer, 2001; Story & Faulkner, 1990; Tirodkar & Jain, 2003; Wallace & Leenders, 2004; Wartella & Robb, 2008; Will, Porter, Geller, & DePasquale, 2005; Wilson et al., 2002; Witt, 2000). Prior to 1985 when Dietz and Gortmaker published their article linking television viewing to obesity (Dietz & Gortmaker, 1985) only a few case studies that focused on changing children’s media use were published (Jason, 1985; Jason & Rooney-Rebeck, 1984). In fact, the American Academy of Pediatrics (AAP) did even not recommend limits to children’s television viewing until 1988 (Rich, 2007). Recently, several interventions that attempt to modify children’s screen time have been developed (Chin, Singh, Brug, & van Mechelen, 2008; Dennison, Russo, Burdick, & Jenkins, 2004; Eisenmann et al., 2008; Epstein et al., 2008; Foster et al., 2008; Goldfield et al., 2006).
This paper presents the results of a systematic review and meta-analysis conducted to identify and examine the effectiveness of interventions to change children’s screen time. The broader behavior of screen time was selected because the AAP recommends limiting children’s total screen time (American Academy of Pediatrics Committee on Public Education, 2001; American Academy of Pediatrics Council on Communications and Media, 2009) and although TV use has remained relatively stable for more than 50 years (Marshall, Gorely, & Biddle, 2006) total screen time has increased over the past ten years (Rideout, et al., 2010). Meta-analysis has been used to study the effects of media (Bushman & Huesmann, 2006; Preiss, et al., 2007), the impact of media use on weight and physical activity (Marshall, et al., 2004) and the impact of interventions on health and behavior (Kahn et al., 2002; Katz, 2009; McCambridge & Jenkins, 2008; Sherry, 2001; Wellman, Sugarman, DiFranza, & Winickoff, 2006). To date, however, no systematic review and meta-analysis of interventions to change children’s screen time has been completed.

Methods

Study Identification

Several methods were used to identify relevant studies including a systematic search of the literature, review of the table of contents of journals not included in searchable databases, review of the reference lists of relevant publications, and a search of the National Institutes of Health’s CRISP funding database (currently “NIH RePORT”). Figure 1 graphically depicts the study identification process.
Between November 24 and December 6, 2008, eight databases that were available through the State University of New York at Albany library were searched for the words ‘television’, ‘media use’, ‘recreational media’, ‘screen time’, ‘trial’, ‘program’, ‘intervention’, and ‘experiment’. Search results were limited to works published between 1985 (the year Dietz and Gortmaker published their article describing the association between children’s television viewing and weight (Dietz & Gortmaker, 1985)) and the end of December 2008. Additionally, the web-based Cochrane Library (The Cochrane Collaboration) and the Centre for Reviews and Dissemination (CRD) (University of York) databases were searched using the search terms outlined above. When possible, search results were downloaded directly into reference manager software and duplicates removed from the database. Search results that could not be downloaded directly to the reference manager were printed and reviewed. The table of contents of two journals that have only recently been indexed in Medline, “Cyberpsychology and Behavior” and “Pediatric Exercise Science” were searched by accessing the website for each journal.

The reference lists of key works, including Cochrane Collaboration reviews of obesity interventions (Oude Luttikhuis et al., 2009; Summerbell et al., 2003) and articles selected for inclusion in the meta-analysis were reviewed for eligible references. In an attempt to increase the number of unpublished works included in the meta-analysis and minimize the impact of the file drawer problem (Rosenthal, 1979) the Academy of Medicine’s Grey Literature Report database, the National Institutes of Health’s funding database, CRISP, and WorldWideScience.org were searched. Researchers indentified through the CRISP search were contacted and asked to provide information about their projects if they believed the projects met the study’s inclusion criteria.
Identification of Eligible Studies

Once the articles were identified, a two step process was used to further screen the eligibility of studies. The abstracts of all references identified were reviewed and articles were identified as eligible for full review if the title or abstract of the article stated that screen time (watching TV or videos/DVDs, playing video or computer games, and using a computer for purposes other than school work) was measured and targeted for change. If no abstract was available, the whole reference was reviewed. Eligibility criteria were based on the PICO framework (populations, interventions, comparisons, and outcomes) (Littell, Corcoran, & Pillai, 2008) and included: 1) the intention of the program was to change the behavior of children (youth ages 0 – 18 years); 2) the study described the evaluation or results of an intervention (any activity or group of related activities aimed at modifying a behavior (Briss, Dolan Mullen, & Hopkins, 2005)) to modify screen time; 3) a comparison to a non-treatment control or comparison group or pre-intervention period was provided; 4) at least one outcome was screen time (watching TV or videos/DVDs, playing video or computer games, or using a computer for purposes other than school work); and 5) television viewing was measured alone or in combination with video viewing and/or computer time. Given resource constraints, only articles published in English were eligible for inclusion in the meta-analysis. Articles that described an intervention that was evaluated using a case study design, did not describe an intervention, or described an intervention that targeted adults were excluded.

Data Extraction and Coding

A standard data extraction instrument based on the Community Guide methods and instrument (Briss, Dolan Mullen, et al., 2005; Briss, Portnoy, Vogel-Taylor, & Zaza,
2005; Briss et al., 2000; Zaza, Briss, & Harris, 2005; Zaza et al., 2000), other review instruments (Kahn et al., 2001; Lipsey & Wilson, 2001; Littell, et al., 2008; Petticrew & Roberts, 2006; van Sluijs, McMinn, & Griffin, 2007), and accepted methodologies (Higgins & Green, updated 2006; Mullen & Ramirez, 2006) was developed and used to review and summarize all references. Information extracted from each article included study design, sample, intervention characteristics, and study results. Study design characteristics extracted included sampling and group assignment procedures, time point of data collection period and type of comparison group used. Sample selection procedures were used to determine if the intervention targeted high risk individuals - studies were defined as targeting high risk individuals if participants were included in the study based on high BMI and/or screen time behavior. Sample size at multiple time points (at randomization and each data collection time point) and the size of the sample used in the analyses were also recorded.

Information about the instruments used by the researchers was also recorded. Studies were categorized as using a valid instrument if authors stated they used a validated instrument or stated they based their data collection instrument on existing validated instruments. Sample demographics and anthropometric characteristics were extracted from each document as was information about the treatment that each group received and any group differences at baseline. Finally, information about study outcomes including means and associated standard deviations, mean change from baseline to post-test, and sample size were extracted for use in calculation of effect sizes. A copy of the data collection tool and associated code-book are provided as a supplement to this chapter (Supplemental Materials).
Analyses

Whenever possible, pre- and post-intervention means (SD) were used to calculate the study effect size (ES); when standard errors were provided, the standard deviation was calculated (Deekes, Higgins, & Altman, updated 2006). When these statistics were not available, post-intervention means (SD), mean change in each group, or adjusted differences post intervention were used to calculate the study ES. If an exact p-value was not provided a conservative approach of using an estimate closest to the significance level provided was taken (e.g., if p<0.01 was provided, p=0.009 was used in the calculation of the ES) (Lipsey & Wilson, 2001; Pigott, 1994).

In meta-analyses, the unit of analysis is the study (Lipsey & Wilson, 2001). Prior to calculation of the overall mean effect size one must assure that the effect sizes included in an analysis are independent, that they are not calculated with data from the same sample (Lipsey & Wilson, 2001; Littell, et al., 2008). Dependence can occur when there are multiple groups within a study, data are reported on subsamples, multiple measures of the same construct are provided, multiple follow-up measures are taken, or multiple effect measures are calculated from the same dataset. Dependence of ESs can generally be handled in one of three ways: 1) a single ES estimate per study can be selected; 2) separate ES estimates can be created for different treatments; or 3) a mean ES for the sample can be calculated (Borenstein, Hedges, Higgins, & Rothstein, 2009; Lipsey & Wilson, 2001; Littell, et al., 2008). Prior to inclusion in the meta-analysis, all studies were carefully reviewed to determine if more than one study presented data from the same populations. Specifically, the sample characteristics and study description were compared when any author appeared on more than one publication. Two such studies
were identified; one (Salmon, Ball, Hume, Booth, & Crawford, 2008) compared three different versions of an intervention and the other study (Gortmaker, Peterson et al., 1999) used three different samples to assess the effects of the intervention. In the first case, the intervention that was most similar to the interventions reported in other studies included in the meta-analysis was used in the analyses. In the second case, the measure used in the analysis was the one that was the focus of the results and discussion sections of the article.

Given that the intent of the meta-analysis was to determine the overall effectiveness of the interventions, and the majority of the interventions included in the analyses did not target a specific group, a mean study ES was calculated when multiple ES statistics could be calculated from subsamples within a study (Borenstein, et al., 2009; Littell, et al., 2008). Additionally, if multiple screen time measures were presented, a mean study ES incorporating the various measures was calculated. This provided an answer to the main study question, “Are interventions effective in decreasing screen time?” In cases where different data collection methods were used (e.g., parent and child report), an average of the two was used to calculate the study ES (Borenstein, et al., 2009). When key information was missing from an article, as was the case in 19 out of 31 eligible of the references, three attempts were made to reach the corresponding author via email before using the available data or eliminating the study from the analysis.

Due to the subjectivity in and difficulty with assessing the overall quality of each study, a single measure of quality assessment was not included in the analyses. Study quality was difficult to assess because many of the articles did not provide the necessary information to make this judgment. Instead, the data analysis plan included study
characteristics which are reflective of study quality (e.g., number of groups, randomization to groups) as potential moderators as outlined in greater detail below.

Once individual study effect sizes were calculated, an assessment of heterogeneity of effect sizes was conducted to confirm the appropriateness of a random effects model. In an attempt to determine variables associated with the heterogeneity, moderator analyses were conducted. Sensitivity and publication bias analyses were conducted to improve accuracy and assess the robustness of the results. The purpose of the sensitivity analyses were to determine the impact of decisions about coding and analysis. Publication bias analyses were conducted to assess the possibility that studies were missed and the impact the missing studies, if included in the analyses, would have on the results.

Reliability analyses. Coding reliability was assessed by having a second researcher code a sub-set of the articles included in the analyses. A random subsample (25%, n=8) of the articles eligible for inclusion in the meta analysis was reviewed by a second reviewer to assess question reliability. Kappa was calculated using Stata (version 9.2) to determine coder agreement beyond chance (Neuendorf, 2002; Orwin, 1994). Kappa values range from zero (exactly what would be expected by chance) to one (perfect agreement) (Viera & Garrett, 2005). Percent agreement between coders was also calculated. All items included in the analyses had at least an 80% coder agreement or a kappa value greater than 0.70. Although opinions of what constitutes acceptable agreement varies, a value greater than 0.60 has been deemed good (Orwin, 1994; Viera & Garrett, 2005) and 0.80 has been deemed acceptable in many situations (Neuendorf,
Any disagreements were settled via consensus. After data entry all studies were reviewed a second time to verify data extraction and entry.

Effect size calculations. Data were entered into and analyzed with a commercially available software package, Comprehensive Meta-Analysis (CMA), Version 2, (Biostat, Inc.) ("Comprehensive Meta-Analysis,"). Two measures of effect and associated 95% confidence intervals were calculated: standard mean difference (SMD) and Hedges g. The SMD is used to compare two groups on their respective means scores on a dependent variable that is not operationalized the same (e.g., television viewing measured as hours per week compared to viewing measured as minutes per day) (Lipsey & Wilson, 2001). If the confidence interval around the SMD does not include zero, the effect of the intervention is statistically significant (Wolf, 1986). Because the SMD effect size statistic can be upwardly biased by small (especially less than 20) sample sizes, Hedges g, which corrects for small sample sizes was also calculated (Littell, et al., 2008). The data were coded such that a negative effect indicated a greater reduction in screen time for the intervention group relative to the control or comparison group or pre-intervention period. A generally accepted criteria for ES magnitude was adopted (0.2 = small, 0.5 = medium, and 0.8 = large) (Cohen, 1988; Littell, et al., 2008; Wolf, 1986).

A random effects model was employed because it was expected that factors that were not measured would vary across studies and affect the results (Borenstein, Hedges, & Rothstein, 2007). A random effects model assumes that the studies included are a sample of eligible studies from a hypothetical population of eligible studies (Hedges, 1994) and takes more sources of variation into account than the fixed effects model (Littell, et al., 2008). Separate random effects models were used to calculated ESs for two
groups of studies; studies that reported data collected during the intervention period (n=5) (studies that measured the amount of screen time while the intervention was being conducted) and studies that reported data collected post intervention (n=27). Three studies provided data collected at during and following the intervention and were therefore represented in both data sets. When data were provided for multiple time points post intervention, data from the time point most proximal to the intervention period was included in the analyses. Because the number of studies that measured data during the intervention period was too small to check for moderators or variation based on study design characteristics (at least 10 studies are required for moderator analyses to be conducted (Littell, et al., 2008)) moderator analyses were conducted only with the larger data set (studies reporting post-intervention data).

**Heterogeneity and moderator analyses.** Tests of heterogeneity were conducted to confirm the appropriateness of a random effects model. Heterogeneity provides an indicator that it may not be appropriate to combine the studies to calculate an overall ES (Wolf, 1986). Heterogeneity can be related to the existence of moderator variables which, in meta analysis are defined as any variable that by inclusion in the analysis accounts for or helps to explain more variance than would otherwise be observed. A moderator variable is identified if the average ES varies from one subset to another (i.e., between different levels of a variable) (Arthur, Bennet, & Huffcutt, 2001; Hunter & Schmidt, 2004). To assess heterogeneity and identify possible moderator variables, ES estimates were calculated for subgroups and associated confidence intervals examined for overlap.

The decision to conduct subgroup analyses was made a priori (Borenstein, et al., 2009; Higgins, Thompson, Deeks, & Altman, 2002) based on the assumption that
heterogeneity existed due to differences in study design and intervention and sample characteristics. Variables tested as moderators included gender; type of data (adjusted, raw); number of study groups; population risk; country; use of a TV control device; outcome (screen time, TV alone); intervention setting (school, home, other); intervention based on theory; racial distribution (up-to 50% non-white, greater than 50% non-white); and sample age. For all subgroup analyses, ES confidence interval overlap, and the between groups Q-test and a significance level of $p \leq 0.05$ were used to assess significant differences between subgroups. A significant Q statistic signifies variability due to more than chance (Borenstein, et al., 2007) or heterogeneity greater than would be expected due to sampling error (Lipsey & Wilson, 2001; Littell, et al., 2008). Because the Q statistic does not provide an assessment of the magnitude of heterogeneity (Huedo-Medina, Sánchez-Meca, Marín-Martínez, & Botella, 2006), $I^2$ (Borenstein, et al., 2009; Higgins & Thompson, 2002; Higgins, Thompson, Deeks, & Altman, 2003; Ioannidis, Patsopoulos, & Evangelou, 2007) was calculated to assess the proportion of variance that reflects real difference in ESs (Borenstein, et al., 2009; Higgins, et al., 2003). If all of the variability is due to sampling error, $I^2$ equals zero. If $I^2$ equals 100, true heterogeneity exists – all variability is due to between study variability (Huedo-Medina, et al., 2006). $I^2$ values of 25, 50, and 75 correspond to low, medium, and high heterogeneity (Huedo-Medina, et al., 2006; Higgins, et al., 2003).

Publication bias. Publication bias is a systematic underrepresentation of null and negative results in the published literature or an increased likelihood that statistically significant positive results will be published compared to non-significant or negative results resulting is one of the largest sources of bias in meta-analysis (Littell, et al., 2008).
Several techniques exist to assess publication bias. Three such techniques, the funnel plot (Egger, Davey Smith, Schneider, & Minder, 1997), failsafe N (Becker, 2005), and Duval and Tweedie’s trim-and-fill method (Duval & Tweedie, 2000; Peters, Sutton, Jones, Abrams, & Rushton, 2007) were used to assess potential publication bias. A funnel plot is a scatter plot of the ES by the sample size. If the ESs are an unbiased representation of the data, the plot will take on an inverted funnel shape with smaller, less precise studies spread out at the widest portion of the funnel and larger more precise studies distributed at the top narrow portion of the funnel. In the absence of publication bias, the distribution of ESs in the funnel plot are symmetrical (Lipsey & Wilson, 2001; Sterne, Becker, & Egger, 2005). The failsafe N or file-drawer number (Becker, 2005) is an estimation of the number of studies that would need to be included in the meta-analysis to change the overall results (Littell, et al., 2008). Duval and Tweedie’s trim-and-fill method assumes that the most undesirable studies are missing (Duval, 2005). It assesses and adjusts for publication bias and small-sample bias using an iterative process in which unmatched observation are removed from the funnel plot and imputed values for missing studies are added, thereby filling in estimates of the ES and standard errors of studies that are likely missing. An asymmetric appearance of many missing studies suggest publication or small-sample bias (Littell, et al., 2008).

Sensitivity analyses. Sensitivity analysis provides a mechanism for assessing the decisions that were made during the review process and determining if the results of the meta-analysis are robust (Littell, et al., 2008). The results are robust if they do not change based on the data included in the analyses. Several sensitivity analyses were conducted to assess the robustness of the results. Although the standard mean difference is a more
intuitive measure, Hedges g may be better suited for the data since it accounts for small sample sizes. Hedges g could only be calculated if two studies that lacked variance were excluded from the analyses. Both SMD and Hedges g were calculated and the resulting ESs and associated confidence intervals were compared. To assess the impact of including studies that provided an adjusted value for changes in television viewing behavior or post-intervention means, the ES was calculated with and without studies that provided adjusted data (n=4). The overall effect size was also calculated repeatedly with one study excluded each time to determine if one the overall effect size was strongly influenced by one particular study.

Results

Systematic Literature Search

A total of 14 databases were searched resulting in 3002 potential works. Thirty three studies were identified as eligible for inclusion in the meta-analysis and 29 were included in the data analyses (Figure 1). Of the 33 eligible studies one was excluded from the analyses because it presented data on two cross-sectional samples (Johnson, Birkett, Evens, & Pickering, 2005) and another because the outcome was binary (less than one hour of TV per day) (Johnston, Huebner, Anderson, Tyll, & Thompson, 2006). All other studies presented continuous data (e.g., hours of screen time per week). Two additional studies were excluded because data were not available (Epstein, Paluch, Gordy, & Dorn, 2000; Epstein et al., 1995). Although one of the pre-defined exclusion criteria was non-English language, no articles written in a language other than English were identified. Out of the 15 authors who were sent emails requesting more information, all but one
responded. Of the 14 authors that responded, eight provided data, four were unable to provide the data requested, and two stated that their work did not meet the study inclusion criteria. Most authors (n = 8) responded to the first email. The average time before receiving a response to the email inquiry was 12 days; it took on average 23 days to receive data. Search of the CRISP database identified 53 records that included the search terms. Only four of these studies were eligible for inclusion. Only one author identified through CRISP responded and did not have any data to provide.

**Intervention Characteristics**

Table 1 provides a brief description of the interventions eligible for inclusion in the meta-analysis and a summary of the study outcomes (n=33). Table 2 provides additional information about the interventions included in the analyses (n=29). More than half (n=18) of the interventions eligible for inclusion in the analysis were theory based. Social cognitive theory was the theory used most frequently. Almost half of the interventions were designed to be delivered in a school (n=13) and screen time (television, vide/DVD, computer, or videogame use alone or in combination) was the primary outcome in 19 interventions. Nine interventions facilitated behavior change by controlling the environment with a TV control device. Many of the interventions facilitated behavior change by setting goals and planning media use—often children participated in this process. Another common feature of the interventions reviewed was a behavioral contract in which children agreed to spend only a specified amount of time in front of a screen. Often, meeting screen time targets was associated with receiving a reward. Several of the interventions included increasing awareness by having children monitor and record their own screen time. Another common feature of the interventions
reviewed was inclusion of both parents and children in the process. Parents were often encouraged to reward positive child behavior. Only one of the interventions included in the review made television viewing contingent on physical activity. Several interventions were school bases. A common characteristic of these interventions was the integration of intervention components into the academic curriculum.

Table 2 also contains information about sample characteristics for each study was included in the analyses. The majority of the interventions targeted children between the ages of 5 and 11 years (n=20). Of the studies that provided information about sample race and gender, most included between 25% and 50% non-white and 25% and 50% male children. Only 10 studies targeted high risk children (eight studies had a weight requirement for participation and five required participants to spend more than a certain amount of time in front of a screen). Most were conducted in the United States.

*Study Characteristics*

As shown in Table 3, the vast majority of the studies included two groups, an intervention and comparison group. Five studies tested the program using a pre- post-test design in one group. Among studies with two groups, most used randomization to assign group membership. All studies reported baseline values of the outcome variable. Few (n = 4) reported data collected during the intervention period and only two studies reported follow-up data. Four of the studies included in the analyses reported adjusted post-intervention data. In roughly half of the studies (n=14) screen time was a primary outcome. Among the other half of the studies, screen time was a secondary outcome or an intermediary outcome (changing screen time was a mechanism to achieve another outcome such as changes in weight). Only five of the interventions measured screen time
related behaviors such as eating related while watching television or having a television in the bedroom. Most studies reported use of a valid data collection tool. The vast majority (n=24) of the studies were reported in peer reviewed journals, while the other three were reported in doctoral dissertations.

Heterogeneity and Moderator Analyses

To confirm the appropriateness of a random effects model, heterogeneity was assessed using two methods. Variables selected a priori. First, a fixed effects model was used to calculate the ES in study subgroups and Q and I^2 were calculated for each subgroup (Table 4). Studies were separated into two groups, those reporting data collected during the intervention and those reporting data collected after the intervention; each group was tested to assess heterogeneity among studies in each group. The within group variability was greater than would be expected by chance, signifying possible heterogeneity within each of the groups (studies reporting data collected during the intervention and studied reporting data post-intervention). The Q value for studies reporting data collected during the intervention period was 13 (n=4, p=0.01) and for those reporting data post-intervention Q=50 (n=27, p=0.003). Within the group of studies that reported post-intervention data, several other groupings were tested for heterogeneity. It was postulated that studies exhibiting several different characteristics including the type of data reported, where the study was found, the type of publication, and sample characteristics would be similar (e.g., studies that used a TV control device would be homogeneous). In most cases, the Q statistic did not support the assumption of homogeneity within study sub-groups. To assess the magnitude of heterogeneity present in the subgroups, the I^2 statistic was calculated for each sub-group (Table 4). In general,
I² values were moderate to high. I² ranged from a low of 27% (the subgroup of studies that compared two interventions) to a high of 80% (the sub-grouping of three studies that were published in dissertations). The presence of heterogeneity within the sub-groups supported the decision to calculate the overall mean effect size using a random effects model.

To determine if the heterogeneity observed in the group of studies reporting data collected at post-test was due to the presence of moderators, a between groups Chi Square test was conducted (Table 4). If the heterogeneity was due to the presence of moderators, the effect sizes between sub-groups would differ (Hunter & Schmidt, 2004). This was not the case – the effect sizes for subgroups tested in the moderator analyses did not differ. Therefore, further analyses were conducted using the full data set as originally planned and a random effects model was used to calculate the overall mean effect size.

*Overall Measure of Effect*

Figures 2a and 2b illustrate the individual study effect sizes (center of the symbol), the contribution (or weight) of the study to the calculation of the overall mean effect (symbol size), and the precision of the study (the length of the line associated with each symbol). A negative effect size denotes an intervention that favored the intervention group, (e.g., there was a significantly greater decrease in the amount of screen time in the intervention group compared to the treatment group).

At post-test, the majority of interventions had a small effect (generally accepted criteria for ES magnitude are 0.2 = small, 0.5 = medium, and 0.8 = large (Cohen, 1988)) and favored the intervention group. Individual intervention effects ranged from -3.98 (Angelbuer 1998) to 0.466 (Weintraub 2008). Several interventions had large effects with
large confidence intervals due to the small sample sizes. These interventions did not impact the overall mean effect size much. The overall mean effect of the interventions included in the analysis was small. At post intervention (the time most proximal to the end of the intervention period), the overall mean standard difference in mean effect size was -0.148 (95% CI -0.224, -0.071) (Figure 2a) and Hedges g was -0.144 (95% CI -0.217, -0.072) (data not shown). Although small, the effect was statistically significant.

During the intervention period (i.e., while the intervention was being delivered), the interventions (n=5) showed a large significant effect (SMD -1.904 (95% CI -3.041, -0.767) on changes in screen time (Figure 2b). Similarly, Hedges g was -1.807 (95% CI -3.069, -0.545) (data not shown). Due to lack of variance, two studies (identified with * in Figures 2a and 2b) could not be included in analyses if Hedge g was calculated. Since the SMD and Hedges g did not differ greatly and two studies could not be included in calculations of Hedges g due to lack of variance, results are presented as SMD.

Publication Bias

Visual observation of the funnel plots in Figures 3 and 4 shows that some publication bias may exist. The filled circles in Figure 3 illustrate potentially missing studies. Based on Duval and Tweedie’s trim and fill method, four studies are missing. If the missing studies were included in the calculation of the overall post intervention mean effect size, the SMD (95% CI) would be -0.133 (-0.218, -0.047), still small but significant. Using these methods to assess publication bias of studies reporting the impact of the intervention during the intervention phase, no missing studies were identified (Figure 4). The final assessment of publication bias, the fail-safe N further supports that the actual effect size in not zero. For the group of studies presenting post-intervention
data, an additional 255 studies reporting no effect would have to be located and included in the analyses to nullify the existing results. For the second set of studies, those presenting data collected during the intervention period, the fail-safe N was 40.

**Sensitivity Analyses**

As mentioned above, the SMD and Hedges g did not vary much, using either method to calculate ES identified in a small yet statistically significant effect. Therefore, the decision to calculate the SMD for ease of interpretation did not impact the overall conclusions. Also, the inclusion of adjusted outcome data in the analyses did not alter the results of the analyses; the mean effect size calculated with adjusted data did not differ from that collected with unadjusted data supporting the inclusion of both types of data in the calculation of the overall mean effect. The overall post-intervention effect size with one study removed ranged from -0.157 (95% CI -0.234, -0.08) to -0.121 (95% CI -0.187, -0.055). The overall effect of the interventions during the intervention period ranged from -2.332 (95% CI -3.353, -1.311) to -1.570 (95% CI: -2.676, -0.465). The difference in overall mean effect size did not meaningfully change when the ES was calculated repeatedly with a different study excluded each time. Therefore, no single study had a large impact on the overall mean effect size.

**Discussion**

This meta-analysis assessed the overall impact of interventions that modified children’s screen time. Results show that interventions to modify children’s screen time have a small but statistically significant effect post intervention (SMD = -0.15; 95% CI -0.22, -0.07) and a large (SMD= -1.90; 95% CI -3.04, -0.77) statistically significant effect
during the intervention. Since excessive screen media use has been associated with many negative behavioral and health consequences, these results support implementing screen time reduction interventions. Although studies included in the meta-analysis were heterogeneous, statistical analyses did not identify any moderator variables. It is possible that the variables causing the heterogeneity were not measured or that the sample size was not large enough to detect moderators. The presence of heterogeneity confirmed the appropriateness of a using a random effects model, a model which accounts for variability among studies (Borenstein, et al., 2007) and is more conservative than a fixed effects model (Borenstein, et al., 2007; Littell, et al., 2008), to calculate overall mean effect.

Several methods were used to increase confidence in the study results. Based on the results of sensitivity analyses, the decision to calculate SMD instead of Hedges g did not impact the conclusion. Although an attempt was made to identify unpublished work (i.e., the CRISP and NY Academy of Medicine Grey Literature databases were search and contacted researchers were asked about other work) none were identified. Visual observation of funnel plots of the studies included in the analyses, Duval and Tweedie’s trim and fill method, and the fail-safe N all support the study conclusions that the impact of the screen time interventions included in the analyses is small but statistically significant. The funnel plot and the trim-and-fill method identified few possible missing studies and the fail-safe N was large – many studies with null results would need to be included in the analyses for the effect to be negated. Collectively, these methods support the validity of the primary finding.
The interventions included in this meta-analysis have several characteristics in common with each other. Four (Angelbuer, 1998; Jason, 1987; Jason, Johnson, & Jurs, 1993; McCanna, 1989) out of the five interventions with large effect sizes post-intervention (SMD -0.54 to -3.98) used a TV control device to help budget screen time (Angelbuer, 1998; Golan, Fainaru, & Weizman, 1998; Jason, 1987; Jason, et al., 1993; McCanna, 1989). The majority (n=5/8) (Epstein, et al., 2008; Gortmaker, Peterson, et al., 1999; Robinson, 1999; Robinson & Borzekowski, 2006; Robinson et al., 2003) of the interventions with medium effect sizes (SMD -0.23 to -0.37) incorporated goal setting or screen time budgeting into the intervention (Dennison, et al., 2004; Eisenmann, et al., 2008; Epstein, et al., 2008; Gortmaker, Peterson, et al., 1999; Nemet et al., 2005; Robinson, 1999; Robinson & Borzekowski, 2006; Robinson, et al., 2003).

The Guide to Community Preventive Services (The Guide) (Zaza, et al., 2000) groups interventions into several categories: interventions that include provision of information only (interventions that try to change knowledge, attitudes, or norms), behavioral interventions (those that try to change behavior by providing skills or materials), environmental interventions (those that try to change the physical and/or social environment), and policy or regulatory interventions. Most of the interventions reviewed include an information provision component (Angelbuer, 1998; Chin, et al., 2008; Dennison, et al., 2004; Eisenmann, et al., 2008; Epstein, et al., 2008; Ford, McDonald, Owens, & Robinson, 2002; Foster, et al., 2008; Golan, et al., 1998; Gortmaker, Cheung et al., 1999; Gortmaker, Peterson, et al., 1999; Harrison, Burns, McGuinness, Heslin, & Murphy, 2006; Jason, 1987; Jason, et al., 1993; Nemet, et al., 2005; Niemeyer, 1988; Nova, Russo, & Sala, 2001; Robinson, 1999; Robinson &
Borzekowski, 2006; Robinson, et al., 2003; Salmon, et al., 2008; Sege et al., 1997; Simon et al., 2006). This strategy has been recommended by Dennison and Edmunds as a means to change behavior (Dennison & Edmunds, 2008). Based on The Guide’s definition of behavioral interventions, the majority of the interventions included in this review, are behavioral interventions. They provide skills by having the child develop a television viewing budget or plan or by setting screen time goals (Angelbuer, 1998; Chin, et al., 2008; Gortmaker, Peterson, et al., 1999; Harrison, et al., 2006; Jason, et al., 1993; Niemeyer, 1988; Robinson, 1999; Robinson & Borzekowski, 2006; Robinson, et al., 2003) or by having the children identify alternative activities (Dennison, et al., 2004; Harrison, et al., 2006; Kipping, Payne, & Lawlor, 2008; Niemeyer, 1988) or develop alternative activities (Salmon, et al., 2008). Several of the interventions could be considered environmental because they sought to change behavior by restricting access to the television/computer using a TV control device (Angelbuer, 1998; Epstein, et al., 2008; Ford, et al., 2002; Goldfield, et al., 2006; Jason, 1987; Jason, et al., 1993; McCanna, 1989; Robinson, 1999; Robinson & Borzekowski, 2006; Robinson, et al., 2003). None of the interventions included in this review attempt to change children’s behavior through regulation but, one intervention (Simon, et al., 2006), included policy makers in the change process by requesting they provide supportive environments for physical activity in the form of low- or no-cost physical activity opportunities.

Several interventions attempted to decrease screen time by providing opportunities for physical activity (Nemet, et al., 2005; Robinson, et al., 2003; Simon, et al., 2006; Weintraub et al., 2008). Time spent with screen media does not appear to replace time spent in physical activity (Rideout, et al., 2010). If we interpret this to also
mean that by increasing physical activity screen time will not decrease, it is not surprising that the intervention that focused solely on participating in a team sport did not decrease screen time in the intervention group. Even though the majority of adolescents (8- to 18-year olds) have media devices in their bedrooms (71% have TVs, 50% video game players, 49% cable TV, 36% computers and 33% internet access) (Rideout, et al., 2010) and 33% of children six years old and younger (Rideout & Hamel, 2006) have TVs in their bedroom only one intervention (Dennison, et al., 2004) reported changes in proportion of study subjects with televisions in the bedroom.

Although 90% of children in home-based child care settings and 35% of children in center-based care settings regularly watch television (Christakis, Garrison, & Zimmerman, 2006) only one intervention focused on childcare settings (Dennison, et al., 2004). Future research and intervention development should focus on changing the childcare environment and behavior of childcare staff and children in the child-care setting. Given that a recent study found less than 50% of parents of preschool children were able to correctly identify the AAP’s recommendations for screen media (Funk, Brouwer, Curtiss, & McBroom, 2009), interventions should include providing information to families about screen time recommendations and guidelines and recommendations should be better publicized and distributed.

Conclusion

Children are able to take media with them now more than ever. The majority of children own cell phones, iPods/MP3 players, and video game players (66%, 76%, 59% respectively) accounting for 20% of media consumption (Rideout, et al., 2010). Reducing
the amount of time children spend with screen media and increasing discriminate media and media use budgeting is important given the negative health and behavioral implications of excessive screen time. Many of the interventions identified here provided children with the skills needed to decrease screen media use. Even modest effects, could result in positive change in the health status of the population given the large number of children who use screen media and the increasing amount of time children spend with media. Since media use is associated with negative behaviors and health outcomes reducing the amount of time children spend with media and teaching children how to be discriminate users of media provides an opportunity to minimize the negative impact of media on children and facilitate the development of positive behaviors. Future work should focus on determining if screen time reduction interventions result in clinically significant effects. Additionally, future research should focus on indentifying critical components of effective interventions.
References


http://www.sciencedownload.net/demodownload/Fixed%20effect%20vs.%20random%20effect.pdf


Deckelbaum, R. J., & Williams, C. L. (2001). Childhood obesity: The health issue. *Obesity Research, 9*(Suppl. 4), 239S-243S.


The Cochrane Collaboration. The Cochrane Library.

<http://www3.interscience.wiley.com/cgi-bin/mrwhome/106568753/HOME>


Table 1: Brief description of interventions eligible for inclusion in the meta-analysis.

<table>
<thead>
<tr>
<th>First author (year)</th>
<th>Intervention name</th>
<th>Intervention Description</th>
<th>Summary of intervention effectiveness based on the author’s results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angelbuer (1998)</td>
<td>The Switch apparatus</td>
<td>Intervention consisted of family counseling including educational component, TV planning, activities menu and a contract with rewards for behavior. Participants were provided a TV control device.</td>
<td>Television viewing was reduced from approximately 30 hours a week during baseline to slightly more than 10 hours a week post intervention.</td>
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<tr>
<td>Chin (2008)</td>
<td>DOiT - Dutch Obesity Intervention in Teenagers</td>
<td>Intervention consisting of a behavioral component (11 lessons for biology and physical education classes to raise awareness and facilitate positive health behaviors) and an environmental component (encouraging additional physical education classes and changes in the school cafeteria)</td>
<td>No significant change in screen-viewing behavior</td>
</tr>
<tr>
<td>Dennison (2004)</td>
<td>Brocodile the Crocodile</td>
<td>Intervention increased awareness by using media diaries and included activities in child care centers. Children were encouraged to turn off the TV. Children were actively involved in identifying alternatives to television viewing</td>
<td>There were significant differences between groups - the intervention group decreased television/video viewing while the control group increased time spent viewing television/videos</td>
</tr>
</tbody>
</table>


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<thead>
<tr>
<th>First author (year)</th>
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<th>Summary of intervention effectiveness based on the author’s results</th>
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<tbody>
<tr>
<td>Eisenmann (2008)</td>
<td>Switch</td>
<td>Intervention consisting of a public education component to increase overall awareness and knowledge of preventing childhood obesity, a school based component which provided information to the families and reinforced the behaviors targeted by the intervention and a family component which included information and planning an tracking materials.</td>
<td>Significant difference in parent-reported screen time at post-intervention and 6 months-post intervention. Change in child-reported screen time was not significant but was lower post-intervention.</td>
</tr>
<tr>
<td>Epstein (2008)</td>
<td>TV Allowance</td>
<td>Weekly budgets for screen time were set and budgets reduced by 10% per month until the budget was 50% of baseline. When the budget was reached, the TV set could not be turned on. Rewards were earned for staying under budget. Parents were also provided with tips to reduce sedentary behavior.</td>
<td>The intervention resulted in a statistically significant and sustained reduction in television viewing and computer use</td>
</tr>
<tr>
<td>First author (year)</td>
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<tr>
<td>Faith (2001)</td>
<td>TV Cycle</td>
<td>During the intervention, TV viewing was contingent on pedaling an exercise cycle at or above a prescribed intensity level.</td>
<td>Among the treatment group TV-viewing time significantly decreased from baseline to weeks 3 to 5, among the control group TV viewing increased. During the 12 weeks period, TV viewing declined in both groups but significantly more so in the intervention group.</td>
</tr>
<tr>
<td>Ford (2002)</td>
<td>TV Allowance</td>
<td>A clinical based intervention that provided families brief counseling about the problems associated with excessive media and 15-20 minute discussions about setting TV budgets. Parents received a TV control device (TV Allowance) to help budget television time.</td>
<td>Both groups reported decreases in screen time. Differences between groups was not-significant. The families who used the TV control device generally reported greater changes.</td>
</tr>
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<tr>
<td>Foster (2008)</td>
<td>Intervention included a school self-assessment; nutrition education and policy, social marketing and parent outreach. School staff were provided with Planet Health and Know Your Body curricula and supporting materials; they also received nutrition and physical activity theme packets to be integrated into classroom lessons, cafeteria promotions, and parent outreach. The family outreach component consisted of the 2-1-5 challenge during which children were challenged to be less sedentary and more physically active.</td>
<td>Time spent in watching television decreased in the intervention group and increased in the control group.</td>
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<tr>
<td>Golan (1998)</td>
<td>The intervention used parents as the agent of change. Parents participated in group session originally held weekly, then bi weekly than once every six weeks (during this time families also attend 5 15 minutes individual sessions). At all sessions parents were taught to alter the family’s sedentary lifestyle.</td>
<td>No reduction in TV viewing time occurred.</td>
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<tr>
<td>Goldfield (2006)</td>
<td>Token TV</td>
<td>Screen time (TV/VDR/DVD) was controlled by an electronic device (Token TV). When tokens were inserted into the device, the TV was activated. Children wore a pedometer that provided them with feedback about their physical activity. Tokens were earned by being physically active.</td>
<td>Screen time decreases in the intervention group and increased in the control group. The differences between groups was significant.</td>
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<tr>
<td>Gortmaker (1999)</td>
<td>Planet Health (Power Down)</td>
<td>The intervention is school based and incorporates intervention material into major subject areas and physical education classes. Materials incorporate curriculum standards so skills and competencies are used to convey the Planet Health messages. 16 core lessons were delivered each of two years. An additional lesson developed a 2 week campaign to reduce television viewing in households (Powel drown).</td>
<td>After adjusting for baseline covariates, the number of hours of television per day was reduced in the intervention schools compared with students in control schools.</td>
</tr>
<tr>
<td>Gortmaker (1999a)</td>
<td>Eat Well and Keep Moving Program</td>
<td>A school based intervention consisting of classroom materials that were integrated into math, science, language arts, and social studies classes. Activities at home were also included.</td>
<td>There was a non-significant reduction in television and video viewing.</td>
</tr>
<tr>
<td>Harrison (2006)</td>
<td>Switch off - Get Active</td>
<td>A ten lesson 16-week health education intervention that emphasized two key messages: the need to minimize screen time and increase physical activity.</td>
<td>There was a decreases in screen time in the intervention group but post intervention viewing was not significantly different from the control group.</td>
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<td>Jason (1987)</td>
<td>A token activated time was attached to the TV set and children had to earn tokens by participating in prosocial activities. Unused tokens could be exchanged for rewards non-television rewards (e.g., money).</td>
<td>The number of hours of television viewing decreased during and after the intervention.</td>
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<tr>
<td>Jason (1993)</td>
<td>The Switch apparatus</td>
<td>A device is attached to the television to control electricity to the set and associated devices - parents controlled turning the Switch on and off thereby controlling TV viewing.</td>
<td>The lock was effective in reducing time spent viewing television.</td>
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<tr>
<td>Jones (2008)</td>
<td>IMPACT (Incorporating More Physical Activity and Calcium in Teens)</td>
<td>Intervention included a health curriculum which included classroom lessons and behavioral journalism – reporting role model stories, a physical education program and a school food service component.</td>
<td>Total screen time was significantly lower in the intervention group compared to the control.</td>
</tr>
<tr>
<td>Kipping (2008)</td>
<td>Active for life 5 Moving intervention.</td>
<td>An adaptation and abbreviated form of the Eat Well Keep Moving intervention. The intervention consisted of 16 lessons on healthy eating, increasing physical activity, and reducing TV viewing.</td>
<td>The intervention group spent less time on screen viewing activities than the control group but the difference was not significant.</td>
</tr>
<tr>
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<tr>
<td>Mauriello (2006)</td>
<td>Health in Motion</td>
<td>Participants’ stage of change is assessed and they receive feedback from a computerized program tailored to their stage. The computer program begins with an introduction to the Health in Motion program and proceeds with alternating assessments and feedback about target behaviors.</td>
<td>The treatment group reported significantly less television viewing.</td>
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<tr>
<td>McCanna (1989)</td>
<td></td>
<td>The intervention consisted of attaching a TV control device (token-actuated time) to the TV - in order to use the television tokens were inserted into the time. Participants received TV tokens for participating in physical activity.</td>
<td>The intervention was most effective for the one excessive television viewer; for the below average viewers’ television viewing rates were minimally affected.</td>
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<tr>
<td>Nemet (2005)</td>
<td></td>
<td>Children and parents were provided counseling and invited to lectures. They participated in a twice-weekly exercise program and encouraged to reduce sedentary activity.</td>
<td>Screen time did not change significantly for the intervention and control subjects.</td>
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<tr>
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<tr>
<td>Niemeyer (1988)</td>
<td>Books and Beyond</td>
<td>The program is designed to promote recreational reading and discriminate television viewing. Student were awarded prizes for reading a specified number of pages or books. The intervention also incorporated home activities including charting time spent reading and viewing television and learning to self-monitor TV viewing through a critical television viewing skills curriculum. Parents were provided materials about discriminate television viewing habits to read and discuss with children.</td>
<td>There was no significant difference between the intervention and comparison groups.</td>
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<tr>
<td>Nova (2001)</td>
<td></td>
<td>The intervention occurred in a family practice office - children and parents were given a specific diet, detailed guidelines regarding physical activity and active parental commitment. Follow-up visits were performed at 1, 2.5, 4, 6, 9, 12, 15, 18, and 24 months.</td>
<td>No significant variations in computer or television use were noted within each group from 0 to 12 months.</td>
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<td>Robinson (1999)</td>
<td>The intervention included 18 30-50 minute lessons that were incorporated into the standard curriculum followed by a TV turnoff. Parents were provided newsletters designed to motivate them to help children stay w/in time budgets. The newsletter s also suggested strategies for limiting screen time . Families were provided a TV Allowance to help with budgeting.</td>
<td>The intervention significantly decreased children's television viewing compared with controls. The intervention group children also reported significantly greater reductions in video game use than controls.</td>
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<tr>
<td>Robinson (2003)</td>
<td>Stanford GEMS (GEMS Jewels and START - Sisters Taking Action to Reduce Television)</td>
<td>GEMS Jewels dance classes were offered 5 days / week(classes started with a snack followed by homework period and then the dance sessions followed by discussions about the importance of dance in the community and culture). START consisted of 5 lessons to be delivered during home visits, TV viewing goals set and strategies for reaching the goal discussed. Families were give a TV Allowance to help with budgeting and newsletters to reinforcement the lessons and provide updates on dance classes.</td>
<td>Compared to controls, the treatment group reported less media use and a significant decrease in total household TV use at follow-up.</td>
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<tr>
<td>Robinson (2006)</td>
<td>SMART (Student Media Awareness to Reduce Television) Classroom Curriculum</td>
<td>The intervention included budgeting screen time and limiting physical access to screen media. 18 30-50 minute classroom lessons plus weekly 5- to 10-minute boosters were delivered. The curriculum consisted of four sections focusing on TV awareness, TV turnoff, developing skills to resist TV viewing, and helping others decrease television viewing. A TV control device (TV allowance) was provided to help budget television. Children were provided incentives for maintaining their weekly media use budget.</td>
<td>compared to controls, the intervention group significantly decreases weekday TV viewing and weekday and Saturday video game playing. There were no significant differences between groups in change in self-reported weekday or Saturday time spent playing on a computer.</td>
</tr>
<tr>
<td>Salmon (2008)</td>
<td>Switch-Play</td>
<td>The behavioral modification component of the intervention included 19 40-50 minute lessons delivered in the classroom. The lessons aimed to increase awareness of current behavior and alternatives and the benefits of physical activity. Children completed a weekly contract to undertake switching off one television program per week over a 4 week period.</td>
<td>Children in the intervention group watched significantly more television on average compared to those in the control group post intervention and at 6 and 12 months follow-up. No significant effects were seen for electronic game playing or computer use.</td>
</tr>
<tr>
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<tr>
<td>Sege (1997)</td>
<td>Health care providers were given a one hour training session that consisted of reviews of the parent materials to be handed out, discussions of the theoretical background of each intervention and the opportunity to discuss implementation details. Providers were to distribute information cards to parents and discuss the material on the card with them at the time of a child's health visit.</td>
<td>There was no significant change in weekday TV viewing habits and a trend toward reductions in weekend TV viewing (The intervention group was slightly more likely to report reductions in weekend TV viewing compared to the control group).</td>
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<tr>
<td>Simon (2006)</td>
<td>ICAPS - Intervention Centered on Adolescents' Physical Activity and Sedentary Behavior</td>
<td>A multi-level program that includes an educational component focusing on physical activity and sedentary behaviors. The intervention included an educational component focusing on physical activity and sedentary behaviors and offered new opportunities for physical activity during and after the school day.</td>
<td>Intervention students had a greater reduction over time of TV/video viewing than controls.</td>
</tr>
<tr>
<td>Weintraub (2008)</td>
<td>SPORT - The Stanford Sports to Prevent Obesity Randomized Trial</td>
<td>Participating 4 (originally 3) days per week of coed soccer. One day per week was a game the other days practice - sessions included a 2.25 hour long homework period followed by an activity period.</td>
<td>Inconsistent results were seen for screen time.</td>
</tr>
<tr>
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<tr>
<td>Epstein (1995)</td>
<td>The intervention consisted of reinforcing children for certain behaviors. All groups received written information on the positive effects of increased physical activity and the negative effects of sedentary behaviors. Participants in the sedentary behavior group were reinforced for decreasing the amount of time spent in sedentary activities and participants in the exercise group were reinforced for increasing physical activity.</td>
<td>Information about changes in sedentary behaviors not available.</td>
<td></td>
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<tr>
<td>Epstein (2000)</td>
<td>Participants in the decrease sedentary activity group were reinforced for reducing sedentary behaviors including watching television and videotapes and playing computer games.</td>
<td>Targeted sedentary behaviors showed a significant decrease from baseline at 6 and 24 months.</td>
<td></td>
</tr>
<tr>
<td>Johnson (2005)</td>
<td>A statewide intervention in WIC clinics that consists of two modules each consisting of background materials, staff training materials, posters, interactive handouts for clients, bookmarks, vouchers, coloring materials and detailed plans for group sessions and other supportive materials.</td>
<td>Between the baseline and the 6-months surveys, the proportion of families who met recommendations for television viewing increased.</td>
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<tr>
<td>Johnston (2006)</td>
<td>Healthy Steps</td>
<td>Parents received parenting classes, developmental and behavioral advice, risk factor screening, postnatal home visits, telephone support, developmental assessments, and the Reach Out and Read literacy program.</td>
<td>Compared to the control group, parents in the intervention group were less likely to allow their children more than 1 hour of daily television viewing.</td>
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</table>
Table 2: Table of sample characteristics and intervention components for studies included in the meta-analysis.

<table>
<thead>
<tr>
<th>First author (year)</th>
<th>Sample characteristics</th>
<th>Intervention Characteristics</th>
<th>Behavior targeted for change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N, age-range, Race/ethnicity, Gender, Location, TV control device used, Theory used in program, Intervention Components, Behavior targeted for change</td>
<td></td>
</tr>
<tr>
<td>Angelbuer (1998)</td>
<td>N=6, 5-11, &gt;50% male</td>
<td>US, Yes – screen, Home, Yes, Other, B, C, INFO, M, R</td>
<td>Yes</td>
</tr>
<tr>
<td>Dennison (2004)</td>
<td>n=77, &lt;5, ≤50% non-white, ≤50% male</td>
<td>US, No, School, No, INFO, R</td>
<td>No snacking while watching TV</td>
</tr>
<tr>
<td>Eisenmann (2008)</td>
<td>N=20, 5-11, ≤50% male</td>
<td>US, No, Home, No, EST, INFO, M, R</td>
<td>No</td>
</tr>
<tr>
<td>First author (year)</td>
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Theory used in program development: BCT - Behavioral Choice Theory; EST – ecological systems theory; SCT – social cognitive theory; TRA/TPB – theory of reasoned action/theory of planned behavior; TTM – transtheoretical model

Intervention components: B – budget; C – contract, Contingent – TV use contingent on another behavior; CU – incorporated into curriculum, G – goal setting, INFO – provision of information, M – monitoring of behavior, PA – physical activity opportunities, Policy – study included a policy change component, R – rewards/reinforcements, Stage – the intervention is based on the individual’s stage of readiness

Targets a high risk sample: Yes – wt – the intervention targets overweight children; Yes – screen – the intervention targets children that exceed a screen time recommendations
Table 3: Table of study design characteristics for studies included in the meta-analysis.

<table>
<thead>
<tr>
<th>First Author (Year)</th>
<th>Number of study groups</th>
<th>Random allocation to groups</th>
<th>Time point of data collection in relation to intervention*</th>
<th>Valid data collection tool used</th>
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<tbody>
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<td>Goldfield (2006)</td>
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*All studies collected data at baseline
Table 4: Effect sizes (95% CI) and between group tests of heterogeneity (Q), assessment of the amount of variability due to random error ($I^2$) and tests of moderators for studies included in the meta-analysis.

<table>
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<th>Variable Subgroup</th>
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Data from studies that reported post-intervention data (n=27)

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*p≤0.01 **p≤0.05
Figure 1: Flow chart illustrating the study identification process.

Database searches and number of potentially eligible references retrieved from each Centre for Reviews and Dissemination (n=19) Cochrane library (n=158) CRISP (n=53) Dissertation and Theses (n=33) Medline - Ebsco (n=141) Medline - PubMed (n=420) National Academy of Medicine Grey Literature (n=33) PapersFirst & Proceedings First (n=73) PsychInfo (n=723) Science Direct (n=11) Scirus (n=698) Social Sciences Abstracts (n=545) Social Work Abstracts (n=68)

Other sources of potentially relevant references (number of references) Personal Files (n=1) Reference list (n=4) WorldWideScience.org (n=458)

Potentially relevant references (duplicates removed) n = 2539

Excluded on basis of title and abstract review n = 2951

Reasons for excluding articles from the analyses case study design (n=2) did not describe an intervention (n=7) targeted adults (n=1) did not measure screen time (n=2) data presented elsewhere (n=4) author stated did not meet criteria (n=2)

Excluded from analyses data not available (n=2) two cross-sectional samples (n = 1) outcome was meeting criteria of <1 hr viewing (n = 1)

References eligible for title and abstract review n = 3002

Included in full review n = 51

Eligible for inclusion in analyses n = 33

Included in analyses n = 29
Figure 2a: Forest plot of the individual study effect sizes, the mean effect size, and the associated 95% confidence limits, standard error, and variance.

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<td>Robinson (2003)</td>
<td>-0.268</td>
<td>0.243</td>
<td>0.261</td>
<td>0.068</td>
<td>-0.778</td>
</tr>
<tr>
<td>Robinson (2006)</td>
<td>-0.238</td>
<td>0.055</td>
<td>0.149</td>
<td>0.022</td>
<td>-0.530</td>
</tr>
<tr>
<td>Salmon (2008)</td>
<td>0.148</td>
<td>0.509</td>
<td>0.184</td>
<td>0.034</td>
<td>-0.213</td>
</tr>
<tr>
<td>Sege (1997)</td>
<td>0.047</td>
<td>0.302</td>
<td>0.130</td>
<td>0.017</td>
<td>-0.208</td>
</tr>
<tr>
<td>Simon (2006)</td>
<td>-0.139</td>
<td>-0.012</td>
<td>0.065</td>
<td>0.004</td>
<td>-0.266</td>
</tr>
<tr>
<td>Weintraub (2008)</td>
<td>0.466</td>
<td>1.342</td>
<td>0.447</td>
<td>0.200</td>
<td>-0.409</td>
</tr>
<tr>
<td>Mean Effect Size</td>
<td>-0.148</td>
<td>-0.071</td>
<td>0.039</td>
<td>0.002</td>
<td>-0.224</td>
</tr>
</tbody>
</table>
Figure 2b: Forest Plot of the individual study effect sizes, the mean effect size, and associated 95% confidence limits, standard error and variance.

<table>
<thead>
<tr>
<th>Study</th>
<th>Point Estimate</th>
<th>Upper Limit</th>
<th>Standard Error</th>
<th>Variance</th>
<th>Lower Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>McCanna (1989)</td>
<td>-0.402</td>
<td>0.509</td>
<td>0.465</td>
<td>0.216</td>
<td>-1.313</td>
</tr>
<tr>
<td>Goldfield (2006)</td>
<td>-1.685</td>
<td>-0.851</td>
<td>0.426</td>
<td>0.181</td>
<td>-2.520</td>
</tr>
<tr>
<td>Faith (2001)</td>
<td>-3.290</td>
<td>-1.405</td>
<td>0.962</td>
<td>0.925</td>
<td>-5.175</td>
</tr>
<tr>
<td>*Jason (1993)</td>
<td>-1.658</td>
<td>0.478</td>
<td>1.090</td>
<td>1.187</td>
<td>-3.793</td>
</tr>
<tr>
<td>Mean Effect Size</td>
<td>-1.904</td>
<td>-0.767</td>
<td>0.580</td>
<td>0.336</td>
<td>-3.041</td>
</tr>
</tbody>
</table>
Figure 3: Funnel plot of observed (open circles) and imputed (filled circles) studies reporting data post intervention and overall mean effect.
Figure 4: Funnel plot of observed (open circles) and imputed (filled circles) studies reporting data during the intervention and overall mean effect.
Supplemental Materials

Meta-analysis Data Collection Codebook

Television Viewing Intervention Systematic Review Data Collection Sheet
CODE BOOK

The data collection instrument is to be completed for EVERY document that is reviewed during “stage 2” (full
document) review.

Do NOT leave any fields blank. In the “Notes” fields enter “none” if you do not have information to include.

The variable name is in bold in the left hand margin. The variable value (what will be entered into the data file)
is next to the response options.

The first page of the instrument will be used to identify the article reviewed and record the exclusion criteria if
applicable.

Make sure you record the document unique identifier (UI) on EACH page - the unique identifier is
written on the top of the first page and corresponds to the EndNote Record Number in the
‘combined_searched.ent’ file.

To avoid missing information extracted from the documents, do not write on the back side of any pages.

Write clearly and in full sentences. Do not assume you will remember what you wrote or why you wrote what
you did. Provide enough information so any reader can understand the information noted or decisions made.
For ease of follow-up if necessary, note the page numbers of the original document where the recorded
information can be found.
DATA COLLECTION INSTRUMENT Cover Page

Rev  Reviewer ____________________________________________
     Clearly print your name.

Date  Date reviewed _______________________________________
     Enter the date that you conducted the review of the article

Ref  First Author and Publication Date
     Enter the first author's last name and the publication date here so can be
     used as verification that have correct article (e.g., Smith JA, 2009) (Note - Titl
     e of Reference, Source, and Retrieval Method can be found in the EndNote database)

UI  Unique identifier
     Enter the document unique identifier (this will correspond to the Endnote ID).

Pub  Type of Publication
     Select the type of publication that is being reviewed.
     1 Peer reviewed journal article  3 Unpublished manuscript other than a

Pubs  4 Other (specify) _________________________________

Inc  Inclusion criteria
     The following is a list of statements that may describe the document being read. Circle the letter next to
     the statement if the statement describes the document/intervention - only circle statements that
     describe the document being reviewed. Select all that apply.

     a  Describes the results of an intervention / is an impact evaluation of an intervention
         NOTE: If the articles provides information about a process evaluation it is not eligible for
         inclusion in the meta-analysis

     b  Intervention modifies television viewing/screen time behavior(s)

     c  Television viewing/screen time behavior is the primary outcome of the intervention

     d  Television viewing/screen time behavior is a secondary or intermediary outcome of the intervention

         If television viewing/screen time is a secondary outcome - note the primary outcome in the space
         provided. If television viewing or screen time is an intermediary outcome - note the primary outcome in
         the space provided.

Inc_ds  Note primary outcome: _______________________________

     An intermediary outcome is a factor that the intervention is changing in
     order to facilitate another change. For example, if the intervention was
     developed to decrease BMI and one of the components is decreasing
     television viewing as a means to decrease BMI, television viewing is an
     intermediary outcome.

     e  Goal to change behavior in children (≤18 years old)
Exclusion criteria

The following is a list of exclusion criteria. Circle the letter next to the statement if the statement describes the document/intervention – only circle statements that describe the document being reviewed. Select all that apply. If any of the following apply to the document being reviewed, no further review is necessary, the document is excluded from the meta-analysis.

a  Document does not describe the results or evaluation of an intervention or describes a process evaluation (and results)

b  Television viewing/screen time behavior is not measured / is not an outcome

c  Document written in language other than English

d  Goal of the intervention is to change behavior in adults (≥ 19 years old)

e  Article is outside of the date range (prior to 1985)

Note: if the article describes a case study, it is not eligible for inclusion in the meta-analysis (the article should have been excluded during the first review phase i.e., the abstract review.

Case study: gathers and analyzes data about an individual (n=1)
DATA COLLECTION INSTRUMENT PAGE 2 - Study Design

Q1 Randomization (How performed (e.g., random number generator?))
Sample selection
Circle the appropriate option to indicate how the study sample was selected - was the sample randomly selected or not.

1 Random selection  0 Non-random selection  7 Unclear/not specified

Q1s Describe sample selection process
Describe the process that was used to select the sample (e.g., a random sample of phone numbers was selected from all numbers within the 518 area code).

Q2 Group assignment
Circle the appropriate answer to indicate how the study sample was assigned to groups, if applicable. If not applicable (i.e., only one group was used), circle '9 – not applicable'.

1 Random assignment  0 Non-random assignment
7 Unclear/not specified  9 Not applicable

Q2s Describe group assignment process
If the participants were assigned to groups using random assignment, note how assignment was conducted (e.g., all participants were assigned an ID number using a random number generator and the participants with the 50 lowest numbers were assigned to the control group). Possible methods for randomization of assignment include computer generated randomization, random number tables, or coins or dice. (These are some common methods but not an exhaustive list.)

Q3 Number of groups
Note how many groups participated in the study (e.g., if there was an intervention and comparison group, there were 2 groups; a study with a treatment, alternative treatment, and no treatment group has 3 groups).

Q4 Comparison Group Used

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Self as control</td>
</tr>
<tr>
<td>2</td>
<td>Control group</td>
</tr>
<tr>
<td>3</td>
<td>Comparison group</td>
</tr>
<tr>
<td>4</td>
<td>Other</td>
</tr>
</tbody>
</table>

Q4s (specify)

Comparison Group Used
If a comparison group was used, identify what type of comparison. Was a control group used, was a comparison group used, did participants serve as their own control (self as control). Did the study us another group to compare results (e.g., compared results to another study). If no control/comparison group was used select “none”.

Control group - a group that does not receive a treatment and is instead assigned to a no-treatment condition, a waiting list for treatment, or placebo control condition (e.g., contact only). Select control group if the group receives no treatment or a placebo and is involved with the study.

Comparison group - a group that is compared with a treatment group and receiving either another treatment or no treatment (Littell, Corcoran, & Pillai, 2008). Select comparison group if study results are compared to a group that is not involved with the study.
Q4a  Description of control/comparison group treatment

Provide a detailed description of any treatment or intervention received by the control/comparison group. If the control group received “usual care” or “standard treatment” include any information that is provided in the article that will describe “usual / standard treatment”. If the comparison group received a different intervention record the name of the intervention that the comparison group received and provide detailed information about the intervention. If no, or little, information is available about the treatment/control group received, note any references that are provided (e.g., group participated in the A-B-C intervention, Brown et. al (2000) JAMA 356(11): 1234-1240)

DATA COLLECTION INSTRUMENT PAGE 3

Q5  Research design (unless otherwise noted, all descriptions of study design are copied from Spector (1981) “Research Design” (Spector, 1981)). The list of designs includes some of the possible designs but is not an exhaustive list. If the designs listed (1 – 7) are not appropriate, select 8 and write the name of the design used in the space provided.

Select the study design used

Single group design
1  pretest - post test design
2  interrupted time series design

Multiple group design
3  two group design – posttest only
4  two group design – pretest / posttest
5  multi-group post test design
6  multi-group pre-post test design
7  interrupted time series
8  multi-group interrupted time series design

Q5s  Other (specify) ________________

Single group design - study utilizes one group of subjects; a single group of subjects is observed and subjects are not assigned to conditions

1 pretest - post test design - measurements are taken before and after the intervention and compared; sometimes called before-and-after studies; involves two measurements of the dependent variable, one before and one after the administration of the intervention

\[ O_1 \quad X \quad O_2 \]
pretest intervention posttest

2 interrupted time series - similar to pretest-posttest except there are more than two measurements. Ideally there are an equal number of measurement periods before and after treatment and the period between measurements is constant

\[ O_1 \; O_{t1} \; O_{t2} \; O_{t3} \; O_{t4} \; O_{t5} \; O_{t6} \; O_{t7} \; O_1 \]
pretest intervention posttest

Multiple group design - study utilizes two or more groups of subjects

3 two group design post-test only - simplest design involves two groups and two variables, one independent and one dependent; investigator assigns subjects to conditions

Group 1 (intervention) \[ X \quad O_1 \]
Group 2 (control/comparison) \[ X \quad O_1 \]

Intervention measurement
4 two group design pre-test / post-test - similar to above but a measurement is taken prior to the intervention as well as after the intervention

| Group1 | O₁ | X₁ | O₂ |
| Group2 | O₁ | X₂ | O₂ |
|        | Pretest | intervention | posttest |

5 multiple-group posttest design - expansion of the two group design with a single dependent variable measured once and an independent variable that can have any number of values or levels

| Group1 | X₁ | O₁ |
| Group2 | X₂ | O₁ |
| Group3 | X₃ | O₁ |
| ...    | ... | ... |
| Groupn | Xₙ | O₁ |
|        | Intervention | measurement |

6 multi-group pre-post test design - involves more than one group of subjects from which two measurements are taken, one before the intervention and one after

| Group1 | O₁ | X₁ | O₂ |
| Group2 | O₁ | X₂ | O₂ |
| Group3 | O₁ | X₃ | O₂ |
| ...    | ... | ... | ... |
| Groupn | O₁ | Xₙ | O₂ |
|        | pretest | intervention | posttest |

7 interrupted time series - similar to pretest-posttest except there are more than two measurements. Ideally there are an equal number of measurement periods before and after treatment and the period between measurements is constant

| O₁ | O₂ | O₃ | O₄ | O₅ | O₆ | O₇ |
| O₁ | O₂ | O₃ | O₄ | O₅ | O₆ | O₇ |
| X₁ | X₂ | X₃ | X₄ | X₅ | X₆ | X₇ |
| O₈ | O₉ | O₁₀ | O₁₁ | O₁₂ | O₁₃ | O₁₄ |
| O₈ | O₉ | O₁₀ | O₁₁ | O₁₂ | O₁₃ | O₁₄ |
| pretest | intervention | posttest |

8 multi-group interrupted time series - multiple measurement of the dependent variable are taken from two or more groups representing levels of the independent variable

| O₁ | O₂ | O₃ | O₄ | O₅ | O₆ | O₇ |
| O₁ | O₂ | O₃ | O₄ | O₅ | O₆ | O₇ |
| X₁ | X₂ | X₃ | X₄ | X₅ | X₆ | X₇ |
| O₈ | O₉ | O₁₀ | O₁₁ | O₁₂ | O₁₃ | O₁₄ |
| O₈ | O₉ | O₁₀ | O₁₁ | O₁₂ | O₁₃ | O₁₄ |
| ... | ... | ... | ... | ... | ... | ... |
| O₁ | O₂ | O₃ | O₄ | O₅ | O₆ | O₇ |
| ... | ... | ... | ... | ... | ... | ... |
| O₈ | O₉ | O₁₀ | O₁₁ | O₁₂ | O₁₃ | O₁₄ |
| O₈ | O₉ | O₁₀ | O₁₁ | O₁₂ | O₁₃ | O₁₄ |
| pretest | intervention | posttest |
Other possible study designs – following is a NON-EXHAUSTIVE list of other possible study designs.

case-control study - a study design in which persons with an outcome (cases) are compared to those without it (controls). A matched case-control study is one in which the cases have been identified and controls are selected to match them on as many characteristics as feasible (Valente, 2002)

cohort study - following longitudinally a group of people who enter the study at the same time (Valente, 2002)

controlled clinical trials - a study that compares two or more treatments conditions using a quasi-random method of allocation or an allocation method that is possibly random (or possibly quasi-random) but not clearly described (Littell, et al., 2008)

ex post facto design - pseudo experimental; groups are matched on several critical variables; only data from matched subjects are analyzed

higher order factorial design - a factorial design with more than two independent variables

longitudinal study - any study in which observations are made over time. Typically used to refer to panel or cross-sectional samples that are collected at multiple points in time (Valente, 2002)

two by two factorial design - consists of two independent variables, each taking on two levels or values (e.g., treatment a/b and sex male/female); each level of one variable is crossed with each level of the other variable; most factorial studies contain independent variables that are factors of interest rather than possible confounders

Solomon four-group design - a combination of the 2x2 factorial and the pretest-postest design used to control for instrument reactivity; two groups receive pre- and post-tests and two groups receive post-tests only

M x N factorial design - an expansion of the 2 x 2 factorial design; the independent variables have any number of levels within practical limits

panel study - a study in which the same respondents are interviewed repeatedly (Valente, 2002)

staggered enrollment design – participants enrolled in study in staggered manner (time between enrollment)

Q6 Notes

Provide any additional information in this area about the study design that can help explain / interpret the design or results. Include statements provided by the authors about the study design.
DATA COLLECTION INSTRUMENT PAGE 4 - Study Sample

Q7 Sample size used in analysis
Enter the number of persons included in the analysis. (If not clear or not specified, select ‘7777’ - unclear / not specified. If not applicable (e.g., no control or comparison group is used) select ‘9999’ - NA.) Enter information for each data collection point (e.g., baseline, post-treatment, follow-up).

a Intervention group
Enter the number of persons in the intervention group.

b Control/comparison group
Enter the number of persons in the control/comparison group where applicable. If there is no control/comparison group select ‘9999’ - NA’

c Total
Enter the total number of participants in the study

d Notes
record any information about the number of participants included in the analyses that will help explain/understand information/results

Q8 Number started intervention
Record the total number and the number of subjects in each group who began the study. (If not clear or not specified, select ‘7777’. If not applicable (e.g., no control or comparison group is used) select ‘9999’ - NA.)

a Intervention Group
record the number of persons who started the intervention in the intervention group

b Control / Comparison group
record the number of persons who started the intervention in the control group. If there is no control/comparison group select ‘9999’ - NA’

c Total
record the number of persons who started the intervention in either study group

d Notes
record any information about the number of participants who began the intervention that will help explain/understand information/results

Q9 Number completed intervention
Record the total number and the number of subjects in each group who finished the intervention. (If not clear or not specified, select ‘7777’. If not applicable (e.g., no control or comparison group is used) select ‘9999’ - NA.)

a Intervention Group
record the number of persons who completed the study in the intervention group

b Control / Comparison group
record the number of persons who completed the study in the control group. If there is no control/comparison group select ‘9999’ - NA’

c Total
record the number of persons who completed the study in either group

d Notes
record any information about the number of participants who completed the study that will help explain/understand information/results
Q10 Number completed post data collection
- Record the total number and the number of subjects in each group from whom data were collected at the end of the intervention. (If not clear or not specified, select ‘7777’. If not applicable (e.g., no control or comparison group is used) select ‘9999’ – NA.)

- a Intervention Group
  - record the number of persons in the intervention group from whom data were collected at the end of the study

- b Control / Comparison group
  - record the number of persons in the control group from whom data were collected at the end of the study. If there is no control/comparison group select ‘9999’ – NA)

- c Total
  - record the number of persons in either study group from whom data were collected at the end of the study

- d Notes
  - record any information about the number of participants from whom data were collected at the end of the study that will help explain/understand information/results

Q11 Number completed follow-up data collection
- Record the total number and the number of subjects in each group from whom data were collected at follow-up period. (If not clear or not specified, select ‘7777’. If not applicable (e.g., no control or comparison group is used) select ‘9999’ – NA.) If there was on follow-up data collected, select ‘9999 – NA’.

- a Intervention Group
  - record the number of persons in the intervention group from whom data were collected at follow-up period.

- b Control / Comparison group
  - record the number of persons in the control group from whom data were collected at follow-up period. If there is no control/comparison group select ‘9999’ – NA)

- c Total
  - record the number of persons in the study from whom data were collected at follow-up period.

- d Notes
  - record any information about the number of participants approached that will help explain/understand information/results
DATA COLLECTION INSTRUMENT PAGE 5 - Sample Characteristics

Complete the table with information about each group. If the requested information is not provided by the authors or if it is unclear, circle "7777-unclear / not specified". If the information is not applicable circle "9999-NA" (e.g., all cells related to the 'control group' should have '9999-NA' circled if the study used only one group).

Record information for all data collection points if available and applicable.

Use the "Notes" section of the table, cell "c", to record clarifying information or information from additional groups (e.g., a second comparison group) if included in the study.

Q15.1 Age - mean & DS

Enter the mean age of participants in each group. Record the standard deviation (SD) of the mean age of the participants in each group. If the information is not provided or unclear circle "7777-unclear / not specified". If the information is not applicable (e.g., if no control group is used, the mean age of the control group is not applicable) circle "9999-NA".

If the mean is not provided, enter any information about the age of the study participants (e.g., frequency and percent of sample in each age category (<5 years old, n = 20; 5-10 years old, n=15; 11-15 years old, n=12) in the "Notes" cell (cell c) of the data collection instrument. If a proxy for age is provided (e.g. second grade students) enter that information in the "Notes" cell (cell c).

a Intervention Group
record the information about persons in the intervention group

b Control / Comparison group
record the information about persons in the control group. If there is no control/comparison group select '9999' - 'NA'

c Notes
record any additional information provided or information that will help describe the sample characteristic being recorded

Q16 Age - range

Enter the age range (e.g., ages 10 – 15) of participants in each group. If the age range is not provided or unclear circle "7777-unclear / not specified". If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle "9999-NA".

a Intervention Group
record the information about persons in the intervention group

b Control / Comparison group
record the information about persons in the control group. If there is no control/comparison group select '9999' - 'NA'

c Notes
record any additional information provided or information that will help describe the sample characteristic being recorded
Q17.1 Race - % Hispanic
Enter the proportion of the each group that is Hispanic (calculate percent by dividing number in group by the total number of study participants). If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

a. Intervention Group
   record the information about persons in the intervention group

b. Control / Comparison group
   record the information about persons in the control group. If there is no control/comparison group select ‘9999’ - ‘NA’)

c. Notes
   record any additional information provided or information that will help describe the sample characteristic being recorded

Q17.2 Race - % white
Enter the proportion of the each group that is white / Caucasian (calculate percent by dividing number in group by the total number of study participants). If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

a. Intervention Group
   record the information about persons in the intervention group

b. Control / Comparison group
   record the information about persons in the control group. If there is no control/comparison group select ‘9999’ - ‘NA’)

c. Notes
   record any additional information provided or information that will help describe the sample characteristic being recorded

Q17.3 Race - % black
Enter the proportion of the each group that is black / African American (calculate percent by dividing number in group by the total number of study participants). If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

a. Intervention Group
   record the information about persons in the intervention group

b. Control / Comparison group
   record the information about persons in the control group. If there is no control/comparison group select ‘9999’ - ‘NA’)

c. Notes
   record any additional information provided or information that will help describe the sample characteristic being recorded
Q17.4 Race - % other

Enter the proportion of the each group that is identified as ‘other’ or the proportion of each group that does not fall into one of the previous categories (calculate percent by dividing number in group by the total number of study participants). If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

a. Intervention Group
   record the information about persons in the intervention group

b. Control / Comparison group
   record the information about persons in the control group. If there is no control/comparison group select ‘9999’ - ‘NA’

c. Notes
   record any additional information provided or information that will help describe the sample characteristic being recorded

Q18 Gender - male

Enter the proportion of the sample that is male (calculate percent by dividing number in group by the total number of study participants). If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

a. Intervention Group
   record the information about persons in the intervention group

b. Control / Comparison group
   record the information about persons in the control group. If there is no control/comparison group select ‘9999’ - ‘NA’

c. Notes
   record any additional information provided or information that will help describe the sample characteristic being recorded

Q22 Country

If the study was conducted in the United States, circle 1 – US. If the study was not conducted in the United States, circle 2 – non-US and complete question Q22s. If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

1. US
2. non-US
7777-unclear / not specified 9999 - NA

a. Intervention Group
   record the information about persons in the intervention group

b. Control / Comparison group
   record the information about persons in the control group. If there is no control/comparison group select ‘9999’ - ‘NA’

c. Notes
   record any additional information provided or information that will help describe the sample characteristic being recorded
Q22 Specify country if non-US ____________

If the intervention was conducted in a country other than the US, in the space provided, write the name of the country where the intervention was conducted (e.g., Norway).

- **as Intervention Group**
  - record the information about persons in the intervention group

- **bs Control / Comparison group**
  - record the information about persons in the control group. If there is no control/comparison group select ‘9999’ - ‘NA’)

- **cs Notes**
  - record any additional information provided or information that will help describe the sample characteristic being recorded
DATA COLLECTION INSTRUMENT PAGE 6 - Anthropometric Characteristics

Provide all available information about anthropometric characteristics (include height, weight, BMI (body mass index) %BF (body fat), and WHR (waist to hip ratio)) of each study group. If normative data are used for anthropometric classification, state percentiles used as cutoffs (e.g., overweight was defined as >85th percentile for BMI). If prediction equations are used for %BF, state which. If the requested information is not provided by the authors or is unclear, circle "7777-unclear/not specified". If the information is not applicable circle "9999-NA" (all cells related to the 'control group' should be coded '9999-NA' if the study used only one group).

Record information for all data collection points if available and applicable.

Use the "Notes" column, cell "c", to provide clarifying information or to record information from an additional study group (e.g., second comparison group) if applicable.

Q23 Height (mean & SD)
   Record all information provided about the height of participants in each study group. Enter the mean height of participants in each group. Record the standard deviation (SD) of the height of the participants in each group. If no information is provided, write not provided. If the information is not provided or unclear circle "7777-unclear/not specified". If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle "9999-NA".

Q23.1 Height - unit of measure
   Circle the unit of measure of height as reported by the study authors
   
   1 inches  4 meters
   2 feet  7777 unclear/not specified
   3 centimeters  9999 NA

   If the information is not provided or unclear circle "7777-unclear/not specified". If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle "9999-NA".

Q24 Weight (mean & SD)
   Record all information provided about the weight of participants in each study group. Enter the mean weight of participants in each group. Record the standard deviation (SD) of the weight of the participants in each group. If no information is provided, write not provided. If the information is not provided or unclear circle "7777-unclear/not specified". If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle "9999-NA".

Q24.1 Weight - unit of measure
   Circle the unit of measure of weight as reported by the study authors
   
   1 pounds  7777 unclear/not specified
   2 kilograms  9999 NA

   If the information is not provided or unclear circle "7777-unclear/not specified". If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle "9999-NA".

Q24.2 BMI (mean & SD)
   Record all information provided about the BMI (Body Mass Index) of participants in each study group. Enter the mean BMI of participants in each group. Record the standard deviation (SD) of the BMI of the participants in each group. If the information is not provided or unclear circle "7777-unclear/not specified". If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle "9999-NA".

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Q25 WHR (waist to hip ratio) (mean & BMI)
Record the all information provided about the WHR (waist to hip ratio) of participants each study group. Enter the mean WHR of participants in each group. Record the standard deviation (SD) of the WHR of the participants in each group. If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

Q26 % overweight
Record the proportion of each study group that is defined by the study authors as overweight (calculate proportion by dividing the number defined as overweight (the frequency) by the total number in the group). If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

Q26.1 % overweight - how defined
Record information provided about how the authors defined overweight (e.g., BMI >85th percentile; BMI >29). If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

Q27 % body fat
Record all information provided about the % body fat of participants in each study group. If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

Q27.1 % body fat - prediction equation
Record the prediction equation used to calculate % body fat (e.g., Durnin & Womersley). If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if no control group is used the value in the control group is not applicable) circle “9999-NA”.

DATA COLLECTION INSTRUMENT PAGE 7

Q28 Note anything else about the sample
Provide any other information available about the study sample(s) (e.g., 5% of control group participants had friends who participated in the intervention). Record any characteristics of the sample that have not been recorded in questions Q15 – Q27.

Q28a Were the groups statistically different at baseline?
Groups are statistically different is the p-value of the test to determine differences between the groups is less than or equal to 0.05. Circle 1- Yes if the groups were statistically different at baseline; Circle 0- No if the groups were not statistically different at baseline. If the information is not provided or unclear circle “7777-unclear / not specified”. If the information is not applicable (e.g., if only one group was used) circle “9999-NA”.

1 Yes 0 No 7777 Don’t Know / not specified 9999 Not-applicable

Q28b Describe significant differences between groups at baseline:
If groups were statistically different at baseline provide detailed information about the differences between groups (e.g., the treatment group was older than the comparison group, mean age 15 ± 3 and 10 ± 4 respectively; the treatment group was significantly older than the comparison group, mean age 15 ± 2 and 8 ± 4 respectively; the treatment group was significantly younger than the comparison group, mean age 15 and 10 respectively, p<0.01). Include information about the significance of the differences. If no differences existed at baseline write “no differences at baseline”. If only one group was used, write “NA - only one group”.

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DATA COLLECTION INSTRUMENT PAGE 8 - Intervention

Q29 Name of Intervention
Record the name of the intervention (e.g., Planet Health). If the comparison group received a different intervention record the name of the intervention that the comparison group received in the “Description of the control/comparison group treatment” box (Q4a on page 2 of the data collection instrument).

Q29a Description of Intervention
Provide a detailed description of the intervention. If no, or little, information about the intervention is provided in the document, note any references that are provided in reference to the intervention (e.g., detailed description of the intervention can be found in Brown et. al (2000) JAMA 356(11): 1234-1240).

DATA COLLECTION INSTRUMENT PAGE 9

Q30 Theory Used in Developing Intervention
Select the theory that was used to develop the intervention based on the information provided in the document. If no theory was specified, select “0 - none specified”. If more than one theory was used to develop the intervention, circle the number that corresponds to all the theories used.

- 0 None specified
- 1 Self-Efficacy Theory
- 2 Social Cognitive Theory
- 3 Health Belief Model
- 4 Transtheoretical Model
- 5 Theory of Reasoned Action / Theory of Planned Behavior
- 6 Attribution Theory
- 7 Ecological Model / Socio-ecological Model

If a theory other than those listed in response options 1 – 7 was used to develop the intervention, circle 8 and write the name of the theory in the space provided.

Q30s Other
(specify) ______________________

Q31 Notes
Include information about the theory/theories used and information to support the answer to question Q30 (e.g. the page number where the authors state the theory used). Provide any other information about the development of the intervention that will help explain the treatment that the intervention group received.
DATA COLLECTION INSTRUMENT PAGE 10 - Intervention Delivery

Q32 Setting of Intervention
Select the setting in which the intervention was conducted. If not enough information was provided to determine where the intervention was delivered select “7777 — unclear / not specified”. If the intervention setting was something other than a ‘research lab’, ‘community’, ‘school’, ‘home’, ‘health care setting’, or ‘WIC clinic’ select other and specify where the intervention was delivered.

1 Research lab 4 Home
2 Community 5 Health care setting
3 School 6 WIC clinic

Q32a 7 Other (specify) ____________________________
7777 Unclear / not specified

Q33 Who delivers the intervention
Identify who delivers the intervention. A research assistant would be categorized as “researcher”. For example, if teachers were trained to deliver an educational intervention in their classroom, the person who delivers the intervention would be “trained end-user”; if a research assistant provided weekly information sessions, select “researcher”. If it is unclear who delivered the intervention, select “7777-unclear/not specified”.

1 Researcher 2 Trained end-user

Q33s 3 Other (specify) ____________________________
7777 Unclear/not specified

If some one other than a researcher or trained end-user delivered the intervention, select “3 — other” and write who delivered in the space provided.

Q34-Q36 Intervention Delivery
Complete the table to provide information about the delivery of the intervention. Enter the page of the document where the information can be found in the “Page” column.

Q34 Time period (dates of intervention)
Record the dates when the intervention was delivered. If the information is not provided, enter “not available” in the table. If the information is not provided or is unclear, circle “7777-unclear / not specified”.

Q35 Frequency
Enter how many times the intervention should be delivered (e.g., once a week; daily). Provided information about how often the intervention, as developed should be delivered. Provide information about what should occur. This information will be used to assess fidelity. If the information is not provided or is unclear, circle “7777-unclear / not specified”.

Q36 Duration (e.g., school year)
Enter for how long the intervention should be delivered (e.g., for four weeks; the school year). Provided information about the duration of the intervention, as developed. Provide information about what should occur. This information will be used to assess fidelity. If the information is not provided or is unclear, circle “7777-unclear / not specified”.

Q37 Exposure (how much is received)
Enter any information about how much of the intervention was received by participants (e.g., only 10 out of 12 sessions occurred; 75% of participants participated in all educational sessions). Provide information about what actually occurred. If the information is not provided or is unclear, circle “7777-unclear / not specified”.

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Q38 Describe any barriers encountered during intervention delivery or development:
   Enter any information about problems that occurred during delivery of the intervention. Include
   information about challenges faced prior to delivering the intervention (including issues related to
   tailoring the intervention for a specific population). Provide information about how barriers or challenges
   were addressed/overcome.

Q39 Notes
   Provide any other information about the delivery of the intervention that could help explain the results of
   the study or describe what or how much treatment the study participants received.
**Q40** Primary outcome

Identify the primary outcome of the intervention. The primary outcome variable is the main factor that intervention was developed to change.

Only select “1 Television viewing” as the primary outcome if television viewing is the only behavior measured. If the measure included viewing of videos (DVD or VHS), playing of video games, or computer use select “2 Screen time” as the outcome.

<table>
<thead>
<tr>
<th>1</th>
<th>Television viewing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Screen time</td>
</tr>
<tr>
<td>3</td>
<td>Physical activity</td>
</tr>
<tr>
<td>4</td>
<td>Obesity</td>
</tr>
<tr>
<td>5</td>
<td>Eating behavior</td>
</tr>
</tbody>
</table>

**Q40s**

| 6 | Other (specify) |=================================

Select **9-Not-applicable** for Q41 – Q44a if the primary outcome is 3 - physical activity, 4 - obesity, 5 - eating behavior that is not TV related (e.g., portion size) or 6 - other (that is not directly related to television (e.g., other related to TV viewing would be removing tv from bedroom))

**Q41** Is the primary outcome variable used in the analysis a continuous variable?

Select the correct answer. A continuous variable is one that can take on any value from 0 to infinity (e.g., weight). A continuous variable is one that can be expressed by a large often infinite number of measures. (Vogt, 1999)

| 1 Yes | 0 No | 7777 Unclear / not specified | 9999 Not-applicable |

**Q42** Is the primary outcome variable used in the analysis a categorical variable?

Select the correct answer. A categorical variable is one that is grouped (e.g., BMI = underweight, normal overweight, obese). A categorical variable is one that distinguishes among subjects by putting them into a limited number of categories indicating type or kind (Vogt, 1999).

| 1 Yes | 0 No | 7777 Unclear / not specified | 9999 Not-applicable |

**Q42a** If the primary outcome variable is a categorical variable was it.....

Select the correct answer.

<table>
<thead>
<tr>
<th>1</th>
<th>collected as continuous and grouped for analyses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>collected as categorical (e.g., the outcome variable is hours of television viewing and the researchers collected survey data with response options of “less than 2 hours / day”, “2 or more hours / day”)</td>
</tr>
<tr>
<td>3</td>
<td>collected as categorical and grouped for analyses (e.g., the outcome variable is hours of television viewing and the researchers collected survey data with response options of “less than 1 hour / day”, “1 - 2 hours / day”, “more than 2 but less than 4 hours / day”, “4 or more hours per day” then grouped individuals based on their response into two categories, “≤ 2 hours / day” and “ &gt; 2 hours / day”)</td>
</tr>
</tbody>
</table>

| 7777 Unclear / not specified |
| 9999 Not-applicable |
Q43  How is the primary outcome measured
    Briefly describe how the primary outcome is measured (e.g., a self report survey was used to collect
    height and weight of study participants).

Q44  Is there a range restriction in the primary outcome
    Select yes if a range restriction (e.g., maximum recorded value is 30, anything above 30 is recorded as
    30 or greater), otherwise select no. If the variable is categorical select NA.

1       Yes     0     No
7777    Unclear / not specified     9999 Not-applicable

Range restrictions occur when distributions are artificially caped or constrained.

Range restriction is the systematic exclusion of certain values (e.g., everything greater than 100 gets
    grouped into a category "> 100" whereas up to that value, i.e., 0 – 100, the actual value was recorded.)

Range restriction – a reduction in the standard deviation or variance of a variable stemming from partial
    or total systematic exclusion of scores in particular ranges of the reference population score distribution.
    (Harris Cooper & Larry V. Hedges, Eds. (1994) The Handbook of Research Synthesis)

Q44a Describe the range restriction on the primary outcome
    If there was a range restriction on the primary outcome variable, describe the range restriction. If the
    answer to Q44 = "0 – No" or "Q44 = 9 - Not applicable” write "NA” in the space provided to answer
    question 44a.
Secondary / Intermediary outcome – Television viewing

“Television viewing” is considered only watching television, if the measure includes viewing of videos (DVD or VHS), playing of video games, or computer use the outcome variable is to be considered “screen time”.

Q45 Is television viewing a secondary / intermediary outcomes
   1 Yes - secondary  2 Yes - intermediary  0 No – neither  7777 Unclear / not specified

Select “9999-Not-applicable” for Q46-Q49a if television viewing is NOT a secondary or intermediary outcome

Q46 Is the secondary/intermediary variable used in the analysis a continuous variable?
   Identify whether the secondary / intermediary outcome is television viewing. A secondary outcomes is any outcome other than the primary one. An intermediary outcome is a behavior / factor that is being changed by the intervention as a means to change the primary outcome (e.g., eating behavior is an intermediary outcome if the intervention was developed to decrease child weight by teaching the child to make healthier food choices).

   1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

Q47 Is the secondary/intermediary variable used in the analysis a categorical variable?
   Select the correct answer. A categorical variable is one that is grouped (e.g., BMI = underweight, normal overweight, obese). A categorical variable is one that distinguishes among subjects by putting them into a limited number of categories indicating type or kind (Vogt, 1999).

   1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

Q47a If the secondary/intermediary variable is a categorical variable was it....
   Select the correct answer. e.g., if the outcome variable is weight status classified as overweight and was determined by measuring BMI and grouping BMI into categories by using a cut-off value (e.g., BMI > 29) then the variable is categorical collected as continuous.

   1 collected as continuous and grouped for analyses
      (e.g., the outcome variable binary indicator of overweight, the authors collected BMI and classified individuals w/ a BMI >30 as "overweight" and those with a BMI ≤ 30 as "not overweight")

   2 collected as categorical
      (e.g., the outcome variable is hours of television viewing and the researchers collected survey data with response options of "less than 2 hours / day", "2 or more hours / day")

   3 collected as categorical and grouped for analyses
      (e.g., the outcome variable is hours of television viewing and the researchers collected survey data with response options of "less than 1 hour / day", "1 - 2 hours / day", "more than 2 but less than 4 hours / day", "4 or more hours per day" then grouped individuals based on their response into two categories, "≤ 2 hours / day" and " > 2 hours / day")

   7777 Unclear / not specified
   9999 Not-applicable

Q48 How is the secondary/intermediary outcome measured
   Briefly describe how the secondary / intermediary outcome is measured (e.g., a self report survey was used to collect height and weight of study participants).
Q49  Is there a range restriction on the secondary/intermediary outcome
Select yes if a range restriction (e.g., maximum recorded value is 30, anything above 30 is recorded as 30 or greater), otherwise select no. If the variable is categorical select NA.

1  Yes    0  No    7777  Unclear / not specified    9999  Not-applicable

Range restrictions occur when distributions are artificially capped or constrained.

Range restriction is the systematic exclusion of certain values (e.g., everything greater than 100 gets grouped into a category “> 100” whereas up to that value, i.e., 0 – 100, the actual value was recorded.

Range restriction – a reduction in the standard deviation or variance of a variable stemming from partial or total systematic exclusion of scores in particular ranges of the reference population score distribution. (Harris Cooper & Larry V. Hedges, Eds. (1994) *The Handbook of Research Synthesis*)

If the answer to Q49 is 1 – Yes, answer Q49a, if the answer is '0 – No’ or '9999 - Not applicable” write “NA” in the space provided to answer question 49a.

Q49a Describe the range restriction on the secondary outcome
If there was a range restriction on the secondary/intermediary outcome variable, describe the range restriction.
DATA COLLECTION INSTRUMENT PAGE 14

Secondary / Intermediary outcome – Screen time

“Screen time” behavior includes the following: viewing videos (DVD or VHS) on a television, computer, or DVD player, playing of video games, or computer use. Watching television combined with video viewing is to be considered “screen time”.

Q50 Is screen time a secondary / intermediary outcomes
   1 Yes - secondary  2 Yes - intermediary  0 No – neither  7777 Unclear / not specified

Select “9999-Not-applicable” for Q51-Q54a if screen time is NOT a secondary or intermediary outcome

Q51 Is the secondary/intermediary variable used in the analysis a continuous variable?
Identify whether the secondary / intermediary outcome is screen time. A secondary outcomes is any outcome other than the primary one. An intermediary outcome is a behavior / factor that is being changed by the intervention as a means to change the primary outcome (e.g., eating behavior is an intermediary outcome if the intervention was developed to decrease child weight by teaching the child to make healthier food choices).

   1 Yes 0 No 7777 Unclear / not specified 9999 Not-applicable

Q52 Is the secondary/intermediary variable used in the analysis a categorical variable?
Select the correct answer. A categorical variable is one that is grouped (e.g., BMI = underweight, normal overweight, obese). A categorical variable is one that distinguishes among subjects by putting them into a limited number of categories indicating type or kind (Vogt, 1999).

   1 Yes 0 No 7777 Unclear / not specified 9999 Not-applicable

Q52a If the secondary/intermediary variable is a categorical variable was it.....
Select the correct answer. e.g., if the outcome variable is weight status classified as overweight and was determined by measuring BMI and grouping BMI into categories by using a cut-off value (e.g., BMI > 29) then the variable is categorical collected as continuous.

   1 collected as continuous and grouped for analyses
      (e.g., the outcome variable binary indicator of overweight, the authors collected BMI and classified individuals w/ a BMI >30 as "overweight" and those with a BMI ≤ 30 as "not overweight")
   2 collected as categorical
      (e.g., the outcome variable is hours of television viewing and the researchers collected survey data with response options of "less than 2 hours / day", "2 or more hours / day")
   3 collected as categorical and grouped for analyses
      (e.g., the outcome variable is hours of television watching and the researchers collected survey data with response options of "less than 1 hour / day", "1 - 2 hours / day", "more than 2 but less than 4 hours / day", "4 or more hours per day" then grouped individuals based on their response into two categories, "≤ 2 hours / day" and " > 2 hours / day")

   7777 Unclear / not specified
   9999 Not-applicable

Q53 How is the secondary/intermediary outcome measured
   Briefly describe how the secondary / intermediary outcome is measured (e.g., a self report survey was used to collect height and weight of study participants).
Q54  Is there a range restriction on the secondary/intermediary outcome
Select yes if a range restriction (e.g., maximum recorded value is 30, anything above 30 is recorded as 30 or greater), otherwise select no. If the variable is categorical select NA.

1  Yes  0  No  7777  Unclear / not specified  9999  Not-applicable

Range restrictions occur when distributions are artificially capped or constrained.

Range restriction is the systematic exclusion of certain values (e.g., everything greater than 100 gets grouped into a category “> 100” whereas up to that value, i.e., 0 – 100, the actual value was recorded.

Range restriction – a reduction in the standard deviation or variance of a variable stemming from partial or total systematic exclusion of scores in particular ranges of the reference population score distribution. (Harris Cooper & Larry V. Hedges, Eds. (1994) The Handbook of Research Synthesis)

If the answer to Q54 is 1 – Yes, answer Q54a, if the answer is ’0 – No” or “9999 - Not applicable” write “NA” in the space provided to answer question 54a.

Q54a Describe the range restriction on the secondary outcome
If there was a range restriction on the secondary/intermediary outcome variable, describe the range restriction.
DATA COLLECTION INSTRUMENT PAGE 15

Secondary / Intermediary outcome – Television or Screen time related (e.g., removing television from the bedroom, eating with the television on)

Q55 Is there an other secondary/intermediary outcome related to television viewing/screen time

1 Yes - secondary  2 Yes - intermediary  0 No – neither  7777 Unclear / not specified

If the answer to Q55 is “1 Yes – secondary”, or “2 Yes – intermediary” answer question Q55s by writing the name of the variable in the space provided (e.g., removing television form the bedroom).

Q55s Identify variable _______________________

Select “9999-Not-applicable” for Q56-Q59a if there is no television viewing/screen time related variable as a secondary or intermediary outcome

Q56 Is the secondary/intermediary variable used in the analysis a continuous variable?

Identify whether the secondary / intermediary outcome is television viewing. A secondary outcomes is any outcome other than the primary one. An intermediary outcome is a behavior / factor that is being changed by the intervention as a means to change the primary outcome (e.g., eating behavior is an intermediary outcome if the intervention was developed to decrease child weight by teaching the child to make healthier food choices).

1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

Q57 Is the secondary/intermediary variable used in the analysis a categorical variable?

Select the correct answer. A categorical variable is one that is grouped (e.g., BMI = underweight, normal overweight, obese). A categorical variable is one that distinguishes among subjects by putting them into a limited number of categories indicating type or kind(Vogt, 1999).

1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

Q57a If the secondary/intermediary variable is a categorical variable was it....

Select the correct answer. e.g., if the outcome variable is weight status classified as overweight and was determined by measuring BMI and grouping BMI into categories by using a cut-off value (e.g., BMI > 29) then the variable is categorical collected as continuous.

1 collected as continuous and grouped for analyses
(e.g., the outcome variable binary indicator of overweight, the authors collected BMI and classified individuals w/ a BMI >30 as “overweight” and those with a BMI ≤ 30 as “not overweight”)

2 collected as categorical
(e.g., the outcome variable is hours of television viewing and the researchers collected survey data with response options of “less than 2 hours / day”, “2 or more hours / day”)

3 collected as categorical and grouped for analyses
(e.g., the outcome variable is hours of television viewing and the researchers collected survey data with response options of “less than 1 hour / day”, “1 - 2 hours / day”, “more than 2 but less than 4 hours / day”, “4 or more hours per day” then grouped individuals based on their response into two categories, “≤ 2 hours / day” and “> 2 hours / day”) collected as continuous and grouped for analyses

7777 Unclear / not specified
9999 Not applicable
Q58 How is the secondary/intermediary outcome measured
   Briefly describe how the secondary/intermediary outcome is measured (e.g., a self report survey was
   used to collect height and weight of study participants).

Q59 Is there a range restriction on the secondary/intermediary outcome
   Select yes if a range restriction (e.g., maximum recorded value is 30, anything above 30 is recorded as
   30 or greater), otherwise select no. If the variable is categorical select NA.
   1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

   Range restrictions occur when distributions are artificially caped or constrained.

   Range restriction is the systematic exclusion of certain values (e.g., everything greater than 100 gets
   grouped into a category "> 100" whereas up to that value, i.e., 0 – 100, the actual value was recorded.

   Range restriction – a reduction in the standard deviation or variance of a variable stemming from partial
   or total systematic exclusion of scores in particular ranges of the reference population score distribution.  
   (Harris Cooper & Larry V. Hedges, Eds. (1994) The Handbook of Research Synthesis)

   If the answer to Q59 is 1 – Yes, answer Q59a, if the answer is "0 – No" or "9999 - Not applicable" write
   "NA" in the space provided to answer question 59a.

Q59a Describe the range restriction on the secondary outcome
   If there was a range restriction on the secondary/intermediary outcome variable, describe the range
   restriction.
DATA COLLECTION INSTRUMENT PAGE 16 - Data Collection

Q60 Time periods of data collection
Enter the time periods (e.g., baseline and follow-up) of data collection. Enter information about when each period occurred (e.g., baseline - 2 months prior to the intervention start date; follow-up - 3 months after the intervention ended; follow-up #2 - 6 months after the end of the intervention)

Q61 Data Collection Method
Circle the method(s) of data collection used to collect information about the outcome variable(s) of interest.

If the intervention participant provided the information it was self-report; if a member of the research team collected the information (e.g., physiological data collection such as having a person stand on a scale and the researcher recording their weight) the method is researcher recorded. If someone other than a member of the research team or the intervention participant provided the information, select ‘proxy report’. If a “research assistant” collects the data, select “3 Researcher recorded”.

Q61s On the line next to method indicate how the data was collected (e.g., telephone survey; focus group; physical exam; observation)

1 Self report  Q61s Method
2 Proxy report Q61s Method
3 Researcher recorded Q61s Method
4 Other Q61s Method

Q62 Description of data collection tool(s).
Provide the name or a description of the data collection tool (e.g., accelerometer by Vendor X; activity scale developed by research team for the purpose of this study)

Q62a Reference for data collection tool.
Record any citation(s) that the authors provided related to the data collection tool(s).

Q63 Was the tool used to collect the outcome data validated?
Indicate whether the tool(s) used to collect the outcome data was tested and validated. If more than one data collection tool was used, indicate whether all tools (Yes - all) or some tools (Yes-some) were validated. If none of the data collection tools/instruments were validated, select “No - none”.

1 Yes - all tools validated
2 Yes - some tools validated
3 No - no tools validated

Q63a Reliability and validity coefficients
Provide any information about the reliability and/or validity of the data collection instrument(s) / tool(s).
DATA COLLECTION INSTRUMENT PAGE 17 - Results

Results
Select the statistical information (select all that apply) that is provided related to the outcome variable(s) of interest. On the next page, enter the statistical information provided about the outcome variables in the appropriate section (column a for the intervention group and column b for the control/comparison group).

- Complete questions 64-76 if the primary outcome variable is television viewing, screen-time, or a variable related to television viewing/screen time (e.g., removing television from the bedroom).
- If television viewing is a secondary or intermediary outcome, answer questions 77 – 89.
- If screen-time is a secondary or intermediary outcome, answer questions 90 – 102.
- If the study measures a secondary or intermediary outcome related to television viewing or screen-time (e.g., removing television from the bedroom), answer questions 103 – 115.

Q64-Q76 Primary Outcome Variable is television viewing, screen time, or television viewing / screen time related

Complete questions 64-76 if the primary outcome variable is television viewing, screen-time, or a variable related to television viewing/screen time (e.g., removing television from the bedroom).

Check the appropriate box
If the primary outcome variable is television viewing, screen time, or television viewing / screen time related check the box next to “Yes”. If the primary variable is television viewing / screen time related, write the name of the variable on the line next to the checked box. If the primary outcome variable is not television viewing, screen time, or television viewing / screen time related, check the “No” box and go to question Q77.

☐ Yes (Variable) ______________________  ☐ No (skip questions Q64 – Q78)

Write the name of the variable on the line

If the answer to question 42 (Q42) on page 12 is 1 – television viewing, 2 – screen time, or 6 – Other (variable related to television viewing or screen time) and the “Yes” box above was checked, complete questions Q64 – Q76. For each question, select the appropriate answer to denote if the statistic was provided (1 Yes, 0 No). If the answer is “1 Yes”, enter the value of the overall statistic(s) (Q76c) and the statistic for the intervention (Q76a) and the control (Q76b) group if applicable. If there is no control group used, enter “9999 NA” in the cell for the control group.

Q64 Mean gain score – Standardized 1 Yes 0 No
Select the appropriate answer to indicate whether a standardized mean gain score is provided.

This statistic may be reported when the study uses one group and measures the value of interest at more than one point in time. The value provides is a pre-post contrast.

A standardized mean gain score is the difference between standardized values. A measure is taken at two points in time (e.g., pretest and posttest) and transformed into a standard score before the difference is calculated. A mean gain score is calculated within a group using measurements taken at two points in time.
Q64a Mean gain score - Unstandardized
Select the appropriate answer to indicate whether an unstandardized mean gain score is provided.

This statistic may be reported when the study uses one group and measures the value of interest at more than one point in time. The value provides is a pre-post contrast.

An unstandardized mean gain score is the difference between values measured at two points in time (e.g., pretest and posttest). The raw scores are used in the calculation. A mean gain score is calculated within a group using measurements taken at two points in time.

Q64b Mean, n, standard deviation, correlation between time 1 and time 2 values
Select the appropriate answer to indicate whether a mean and standard deviation, the number of participants, and the correlation between the value of interest at time 1 and time 2 are provided.

Record values provided for each group and all data collection time points.

Q65 Unstandardized mean difference
Select the appropriate answer to indicate whether an unstandardized mean difference is provided.

This statistic may be reported when the study uses two groups.

The unstandardized mean difference applies to contrasts between groups when the variable of interest is operationalized the same. The mean difference is the mean of one group minus the mean of another. A unstandardized mean difference is calculated between groups using measurements taken from two different groups – the mean of one group is subtracted from the mean of the other group.

Q65a Mean, n, standard deviation
Select the appropriate answer to indicate whether a mean and standard deviation and the number of participants are provided.

Record values provided for each group and all data collection time points.

Q66 Standardized mean difference (SMD) (also know as Cohen’s d)
Select the appropriate answer to indicate whether a standardized mean difference (Cohen’s d) is provided.

This statistic may be reported when the study uses two groups.

The standardized mean difference is the difference between means in two groups divided by the pooled SD of the two groups.

Q67 Hedges g
Select the appropriate answer to indicate whether Hedges g is provided.

Hedges g is an effect size measure used with continuous data. This statistic may be reported when the study uses two groups.

Hedges g is similar to the standardized mean difference. The statistic applies a correct to the standardized mean difference to account for bias related to small sample size.

Q68 Correlation between data measured at multiple points in time
Select the appropriate answer to indicate whether a correlation between multiple points in time is provided.

The correlation coefficient r expresses the strength and direction of an association between two continuous variables.
Q89 p-value
Select the appropriate answer to indicate whether a p value is provided.

Record the exact p-value reported for a t-test or ANOVA and all sample size information provided (for each group or the total sample size).

Q70 t-test results
Select the appropriate answer to indicate whether t-test results are provided.

Record the t value and the sample size in each group – can be used to convert the t statistic to an effect size. Record the p-value and any other information related to the statistical test.

Q71 F-ratio
Select the appropriate answer to indicate whether a F-ratios are provided.

Record the value of F-ratio value from the ANOVA, and the degrees of freedom (n=df + 2). Record the p-value if provided. Use for comparing two group means.

Q72 Proportion who experience event
Select the appropriate answer to indicate whether proportions are provided.

This statistic represents a one variable relationship.

Calculated by dividing the number with the characteristic of interest by the total number of individuals. Values range between 0 and 1.0.

Q73 Odds Ratio
Select the appropriate answer to indicate whether an odds ratio is provided.

An odds ratio is a ratio of two odds values (odds – the chance an event will occur divided by the chance that the event will not occur).

Q73a Risk Ratio
Select the appropriate answer to indicate whether an risk ratio is provided.

The risk ratio is the probability of an event in one group over the probability of an event in another group.

Q74a Number who experience event / number who do not experience event provided
Select the appropriate answer to indicate whether the number who experience event and number who do not experience the event are provided.

Q74b Number who experience event / number in whole group provided
Select the appropriate answer to indicate whether the number who experience event and the total number are provided.

Q75 Other statistic(s) provided
Select the appropriate answer to indicate whether a statistic(s) that is not listed above is provided. If so, write the name of the statistic provided on the line next to Q75s (specify).

Q75s (specify)

Record the values of the statistics identified above on data collection instrument page 18 (question Q76). Be sure to include all information related to the statistic that the authors provide.
Q76  Statistics related to the primary outcome variable (if primary outcome variable is television viewing, screen time, or television viewing / screen time related)

a  Value of statistic(s) in the intervention group
   Record the value of the statistic(s) provided for the intervention group. Record the value of the statistic at all data collection time points (e.g., record mean at baseline and follow-up). Include any additional information related to the statistic that was provide (e.g., n in each group).

b  Value of statistic(s) in the comparison / control group
   Record the value of the statistic(s) provided for the comparison/control group. Record the value of the statistic at all data collection time points (e.g., record mean at baseline and follow-up). Include any additional information related to the statistic that was provide (e.g., n in each group).

c  Value of the overall statistic(s)
   Record the value of the statistic(s) used to compare the two groups (e.g., the F-value and p-value from an ANOVA). Also include sample sized and/or degrees of freedom.
DATA COLLECTION INSTRUMENT PAGE 19

Q77-Q89  Secondary / Intermediary Outcome Variable (television viewing)

If television viewing is a secondary or intermediary outcome, answer questions 77 – 89.

Check the appropriate box

If television viewing is a secondary / intermediary outcome variable check the box next to “Yes”. If television viewing is not a secondary / intermediary outcome variable, check the “No” box and go to question Q90.

☐ Yes  ☐ No (skip questions Q77 – Q89)

If the primary variable is not television viewing, screen time, or television viewing / screen time related skip questions Q77 – Q89.

If the answer to question 45 (Q45) on page 13 is "1 Yes – secondary" or "2 Yes – intermediary" and the “Yes” box above was checked, complete questions Q77 – Q89. For each question, select the appropriate answer to denote if the statistic was provided (1 – Yes, 0 – No). If the answer is 1 – Yes, enter the value of the overall statistic(s) (Q89c) and the statistic for the intervention (Q89a) and the control (Q89b) group if applicable. If no control / comparison group is used, enter “99999” in the cells for the control/comparison group.

Q77  Mean gain score - Standardized  1 Yes  0 No

Select the appropriate answer to indicate whether a standardized mean gain score is provided.

This statistic may be reported when the study uses one group and measures the value of interest at more than one point in time. The value provides a pre-post contrast.

A standardized mean gain score is the difference between standardized values. A measure is taken at two points in time (e.g., pretest and posttest) and transformed into a standard score before the difference is calculated. A mean gain score is calculated within a group using measurements taken at two points in time.

Q77a  Mean gain score - Unstandardized  1 Yes  0 No

Select the appropriate answer to indicate whether an unstandardized mean gain score is provided.

This statistic may be reported when the study uses one group and measures the value of interest at more than one point in time. The value provides a pre-post contrast.

An unstandardized mean gain score is the difference between values measured at two points in time (e.g., pretest and posttest). The raw scores are used in the calculation. A mean gain score is calculated within a group using measurements taken at two points in time.

Q77b  Mean, n, standard deviation, correlation between time 1 and time 2 values  1 Yes  0 No

Select the appropriate answer to indicate whether a mean and standard deviation, the number of participants, and the correlation between the value of interest at time 1 and time 2 are provided.

Record values provided for each group and all data collection time points.
Q78  Unstandardized mean difference
1 Yes 0 No
Select the appropriate answer to indicate whether an unstandardized mean difference is provided.

This statistic may be reported when the study uses two groups.
The unstandardized mean difference applies to contrasts between groups when the variable of interest is operationalized the same. The mean difference is the mean of one group minus the mean of another. A unstandardized mean difference is calculated between groups using measurements taken from two different groups – the mean of one group is subtracted from the mean of the other group.

Q78a Mean, n, standard deviation
1 Yes 0 No
Select the appropriate answer to indicate whether a mean and standard deviation and the number of participants are provided.

Record values provided for each group and all data collection time points.

Q79  Standardized mean difference (SMD) (also know as Cohen’s d)
1 Yes 0 No
Select the appropriate answer to indicate whether a standardized mean difference (Cohen’s d) is provided.

This statistic may be reported when the study uses two groups.
The standardized mean difference is the difference between means in two groups divided by the pooled SD of the two groups.

Q80  Hedges g
1 Yes 0 No
Select the appropriate answer to indicate whether Hedges g is provided.

Hedges g is an effect size measure used with continuous data. This statistic may be reported when the study uses two groups.

Hedges g is similar to the standardized mean difference. The statistic applies a correct to the standardized mean difference to account for bias related to small sample size.

Q81  Correlation between data measured at multiple points in time
1 Yes 0 No
Select the appropriate answer to indicate whether a correlation between multiple points in time is provided.

The correlation coefficient r expresses the strength and direction of an association between two continuous variables.

Q82  p-value
1 Yes 0 No
Select the appropriate answer to indicate whether a p value is provided.

Record the exact p-value reported for a t-test or ANOVA and all sample size information provided (for each group or the total sample size).

Q83  t-test results
1 Yes 0 No
Select the appropriate answer to indicate whether t-test results are provided.

Record the t value and the sample size in each group – can be used to convert the t statistic to an effect size. Record the p-value and any other information related to the statistical test.
<table>
<thead>
<tr>
<th>Q84</th>
<th>F-ratio</th>
<th>1 Yes</th>
<th>0 No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Select the appropriate answer to indicate whether a F-ratios are provided.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Record the value of F-ratio value from the ANOVA, and the degrees of freedom (n=df + 2). Record the p-value if provided. Use for comparing two group means.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q85</th>
<th>Proportion who experience event</th>
<th>1 Yes</th>
<th>0 No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Select the appropriate answer to indicate whether proportions are provided.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>This statistic represents a one variable relationship.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Calculated by dividing the number with the characteristic of interest by the total number of individuals. Values range between 0 and 1.0.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q86</th>
<th>Odds Ratio</th>
<th>1 Yes</th>
<th>0 No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Select the appropriate answer to indicate whether an odds ratio is provided.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>An odds ratio is a ratio of two odds values (odds – the chance an event will occur divided by the chance that the event will not occur).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q86a</th>
<th>Risk Ratio</th>
<th>1 Yes</th>
<th>0 No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Select the appropriate answer to indicate whether an risk ratio is provided.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The risk ratio is the probability of an event in one group over the probability of an event in another group.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q87a</th>
<th>Number who experience event / number who do not experience event provided</th>
<th>1 Yes</th>
<th>0 No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Select the appropriate answer to indicate whether the number who experience event and number who do not experience the event are provided.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q87b</th>
<th>Number who experience event / number in whole group provided</th>
<th>1 Yes</th>
<th>0 No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Select the appropriate answer to indicate whether the number who experience event and the total number are provided.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q88</th>
<th>Other statistic(s) provided</th>
<th>1 Yes</th>
<th>0 No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Select the appropriate answer to indicate whether a statistic(s) that is not listed above is provided. If so, write the name of the statistic provided on the line next to Q75s (specify).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q88s</th>
<th>(specify)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Record the values of the statistics identified above on data collection instrument page 20 (question Q89). Be sure to include all information related to the statistic that the authors provide.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q89 Statistics related to the primary outcome variable (if primary outcome variable is television viewing, screen time, or television viewing/sleep time related)

a  **Value of statistic(s) in the intervention group**
   Record the value of the statistic(s) provided for the intervention group. Record the value of the statistic at all data collection time points (e.g., record mean at baseline and follow-up). Include any additional information related to the statistic that was provided (e.g., n in each group).

b  **Value of statistic(s) in the comparison/control group**
   Record the value of the statistic(s) provided for the comparison/control group. Record the value of the statistic at all data collection time points (e.g., record mean at baseline and follow-up). Include any additional information related to the statistic that was provided (e.g., n in each group).

c  **Value of the overall statistic(s)**
   Record the value of the statistic(s) used to compare the two groups (e.g., the F-value and p-value from an ANOVA). Also include sample sizes and/or degrees of freedom.
DATA COLLECTION INSTRUMENT PAGE 21

Q90-Q102  Secondary Outcome Variable (screen time)

If the screen time is a secondary / intermediary outcome variable answer questions Q90-Q102.

Check the appropriate box

☐ Yes  ☐ No (skip questions Q90 – Q102)

If screen time is a secondary / intermediary outcome variable check the box next to “Yes”. If screen time is not a secondary / intermediary outcome variable, check the “No” box and go to question Q103.

If the primary variable is not television viewing, screen time, or television viewing / screen time related skip questions Q90 – Q102.

If the answer to question 50 (Q50) on page 14 is “1 Yes – secondary” or “2 Yes – intermediary” and the “Yes” box above was checked, complete questions Q90 – Q102. For each question, select the appropriate answer to denote if the statistic was provided (1 – Yes, 0 – No). If the answer is 1 – Yes, enter the value of the overall statistic(s) (Q102c) and the statistic for the intervention (Q102a) and the control (Q102b) group if applicable. If no control / comparison group is used, enter “9999” in the cells for the control/comparison group.

Q90  Mean gain score - Standardized

Select the appropriate answer to indicate whether a standardized mean gain score is provided.

1 Yes  0 No

This statistic may be reported when the study uses one group and measures the value of interest at more than one point in time. The value provides is a pre-post contrast.

A standardized mean gain score is the difference between standardized values. A measure is taken at two points in time (e.g., pretest and posttest) and transformed into a standard score before the difference is calculated. A mean gain score is calculated within a group using measurements taken at two points in time.

Q90a Mean gain score - Unstandardized

Select the appropriate answer to indicate whether an unstandardized mean gain score is provided.

1 Yes  0 No

This statistic may be reported when the study uses one group and measures the value of interest at more than one point in time. The value provides is a pre-post contrast.

An unstandardized mean gain score is the difference between values measured at two points in time (e.g., pretest and posttest). The raw scores are used in the calculation. A mean gain score is calculated within a group using measurements taken at two points in time.

Q90b Mean, n, standard deviation, correlation between time 1 and time 2 values

Select the appropriate answer to indicate whether a mean and standard deviation, the number of participants, and the correlation between the value of interest at time 1 and time 2 are provided.

Record values provided for each group and all data collection time points.
Q81 Unstandardized mean difference
Select the appropriate answer to indicate whether an unstandardized mean difference is provided.
This statistic may be reported when the study uses two groups.
The unstandardized mean difference applies to contrasts between groups when the variable of interest is operationalized the same. The mean difference is the mean of one group minus the mean of another. A unstandardized mean difference is calculated between groups using measurements taken from two different groups – the mean of one group is subtracted from the mean of the other group.

Q81a Mean, n, standard deviation
Select the appropriate answer to indicate whether a mean and standard deviation and the number of participants are provided.
Record values provided for each group and all data collection time points.

Q82 Standardized mean difference (SMD) (also know as Cohen’s d)
Select the appropriate answer to indicate whether a standardized mean difference (Cohen’s d) is provided.
This statistic may be reported when the study uses two groups.
The standardized mean difference is the difference between means in two groups divided by the pooled SD of the two groups.

Q83 Hedges g
Select the appropriate answer to indicate whether Hedges g is provided.
Hedges g is an effect size measure used with continuous data. This statistic may be reported when the study uses two groups.
Hedges g is similar to the standardized mean difference. The statistic applies a correct to the standardized mean difference to account for bias related to small sample size.

Q84 Correlation between data measured at multiple points in time
Select the appropriate answer to indicate whether a correlation between multiple points in time is provided.
The correlation coefficient r expresses the strength and direction of an association between two continuous variables.

Q85 p-value
Select the appropriate answer to indicate whether a p value is provided.
Record the exact p-value reported for a t-test or ANOVA and all sample size information provided (for each group or the total sample size).

Q86 t-test results
Select the appropriate answer to indicate whether t-test results are provided.
Record the t value and the sample size in each group – can be used to convert the t statistic to an effect size. Record the p-value and any other information related to the statistical test.
Q87 F-ratio  
Select the appropriate answer to indicate whether a F-ratios are provided. 

Record the value of F-ratio value from the ANOVA, and the degrees of freedom (n=df + 2). Record the p-value if provided. Use for comparing two group means.

Q88 Proportion who experience event  
Select the appropriate answer to indicate whether proportions are provided. 

This statistic represents a one variable relationship. 

Calculated by dividing the number with the characteristic of interest by the total number of individuals. Values range between 0 and 1.0.

Q89 Odds Ratio  
Select the appropriate answer to indicate whether an odds ratio is provided. 

An odds ratio is a ratio of two odds values (odds – the chance an event will occur divided by the chance that the event will not occur).

Q89a Risk Ratio  
Select the appropriate answer to indicate whether an risk ratio is provided. 

The risk ratio is the probability of an event in one group over the probability of an event in another group.

Q100a Number who experience event / number who do not experience event provided  
Select the appropriate answer to indicate whether the number who experience event and number who do not experience the event are provided.

Q100b Number who experience event / number in whole group provided  
Select the appropriate answer to indicate whether the number who experience event and the total number are provided.

Q101 Other statistic(s) provided  
Select the appropriate answer to indicate whether a statistic(s) that is not listed above is provided. If so, write the name of the statistic provided on the line next to Q75s (specify).

Q101s  
(specific)

Record the values of the statistics identified above on data collection instrument page 22 (question Q102). Be sure to include all information related to the statistic that the authors provide.
Q102 Statistics related to the primary outcome variable (if primary outcome variable is television viewing, screen time, or television viewing / screen time related)

a  Value of statistic(s) in the intervention group
Record the value of the statistic(s) provided for the intervention group. Record the value of the statistic at all data collection time points (e.g., record mean at baseline and follow-up). Include any additional information related to the statistic that was provide (e.g., n in each group).

b  Value of statistic(s) in the comparison / control group
Record the value of the statistic(s) provided for the comparison/control group. Record the value of the statistic at all data collection time points (e.g., record mean at baseline and follow-up). Include any additional information related to the statistic that was provide (e.g., n in each group).

c  Value of the overall statistic(s)
Record the value of the statistic(s) used to compare the two groups (e.g., the F-value and p-value from an ANOVA). Also include sample sized and/or degrees of freedom.
DATA COLLECTION INSTRUMENT PAGE 23

Q103-Q115  Secondary / Intermediary Outcome Variable (television viewing / screen time related)

If the secondary / intermediary outcome variable is related to television viewing or screen time
answer questions Q103-Q115.

Check the appropriate box

If the secondary / intermediary outcome variable is related to television viewing or screen time check the
box next to “Yes”. If the secondary / intermediary outcome variable is not related to television viewing
or screen time, check the “No” box and go to question Q116.

☐ Yes (Variable) ...........................................  ☐ No (skip questions Q103 – Q115)

Write the name of the variable on the line

If the primary variable is not television viewing,
screen time, or television viewing / screen time
related skip questions Q103 – Q115.

If the answer to question 55 (Q55) on page 15 is “1 Yes – secondary” or “2 Yes – intermediary” and the
“Yes” box above was checked, complete questions Q103 – Q115. For each question, select the
appropriate answer to denote if the statistic was provided (1 – Yes, 0 – No). If the answer is 1 – Yes,
enter the value of the overall statistic(s) (Q102c) and the statistic for the intervention (Q102a) and the
control (Q102b) group if applicable. If no control / comparison group is used, enter “9999” in the cells for
the control/comparison group.

Q103 Mean gain score - Standardized

Select the appropriate answer to indicate whether a standardized mean gain score is provided.

1 Yes  0 No

This statistic may be reported when the study uses one group and measures the value of interest at more
than one point in time. The value provides is a pre-post contrast.

A standardized mean gain score is the difference between standardized values. A measure is taken at
two points in time (e.g., pretest and posttest) and transformed into a standard score before the difference
is calculated. A mean gain score is calculated within a group using measurements taken at two points in
time.

Q103a Mean gain score - Unstandardized

Select the appropriate answer to indicate whether an unstandardized mean gain score is provided.

1 Yes  0 No

This statistic may be reported when the study uses one group and measures the value of interest at more
than one point in time. The value provides is a pre-post contrast.

An unstandardized mean gain score is the difference between values measured at two points in time
(e.g., pretest and posttest). The raw scores are used in the calculation. A mean gain score is calculated
within a group using measurements taken at two points in time.

Q103b Mean, n, standard deviation, correlation between time 1 and time 2 values

Select the appropriate answer to indicate whether a mean and standard deviation, the number of
participants, and the correlation between the value of interest at time 1 and time 2 are provided.

Record values provided for each group and all data collection time points.
Q104 Unstandardized mean difference 1 Yes 0 No
Select the appropriate answer to indicate whether an unstandardized mean difference is provided.

This statistic may be reported when the study uses two groups.

The unstandardized mean difference applies to contrasts between groups when the variable of interest is operationalized the same. The mean difference is the mean of one group minus the mean of another. A unstandardized mean difference is calculated between groups using measurements taken from two different groups – the mean of one group is subtracted from the mean of the other group.

Q104a Mean, n, standard deviation 1 Yes 0 No
Select the appropriate answer to indicate whether a mean and standard deviation and the number of participants are provided.

Record values provided for each group and all data collection time points.

Q105 Standardized mean difference (SMD) (also know as Cohen’s d) 1 Yes 0 No
Select the appropriate answer to indicate whether a standardized mean difference (Cohen’s d) is provided.

This statistic may be reported when the study uses two groups.

The standardized mean difference is the difference between means in two groups divided by the pooled SD of the two groups.

Q106 Hedges g 1 Yes 0 No
Select the appropriate answer to indicate whether Hedges g is provided.

Hedges g is an effect size measure used with continuous data. This statistic may be reported when the study uses two groups.

Hedges g is similar to the standardized mean difference. The statistic applies a correct to the standardized mean difference to account for bias related to small sample size.

Q107 Correlation between data measured at multiple points in time 1 Yes 0 No
Select the appropriate answer to indicate whether a correlation between multiple points in time is provided.

The correlation coefficient r expresses the strength and direction of an association between two continuous variables.

Q108 p-value 1 Yes 0 No
Select the appropriate answer to indicate whether a p value is provided.

Record the exact p-value reported for a t-test or ANOVA and all sample size information provided (for each group or the total sample size).

Q109 t-test results 1 Yes 0 No
Select the appropriate answer to indicate whether t-test results are provided.

Record the t value and the sample size in each group – can be used to convert the t statistic to an effect size. Record the p-value and any other information related to the statistical test.
Q110 F-ratio  
Select the appropriate answer to indicate whether a F-ratios are provided.
Record the value of F-ratio value from the ANOVA, and the degrees of freedom (n=df + 2). Record the p-value if provided. Use for comparing two group means.

Q111 Proportion who experience event  
Select the appropriate answer to indicate whether proportions are provided.
This statistic represents a one variable relationship.
Calculated by dividing the number with the characteristic of interest by the total number of individuals. Values range between 0 and 1.0.

Q112 Odds Ratio  
Select the appropriate answer to indicate whether an odds ratio is provided.
An odds ratio is a ratio of two odds values (odds – the chance an event will occur divided by the chance that the event will not occur).

Q112a Risk Ratio  
Select the appropriate answer to indicate whether an risk ratio is provided.
The risk ratio is the probability of an event in one group over the probability of an event in another group.

Q113a Number who experience event / number who do not experience event provided  
Select the appropriate answer to indicate whether the number who experience event and number who do not experience the event are provided.

Q113b Number who experience event / number in whole group provided  
Select the appropriate answer to indicate whether the number who experience event and the total number are provided.

Q114 Other statistic(s) provided  
Select the appropriate answer to indicate whether a statistic(s) that is not listed above is provided. If so, write the name of the statistic provided on the line next to Q75s (specify).

Q114s  
(specify)
Record the values of the statistics identified above on data collection instrument page 24 (question Q115). Be sure to include all information related to the statistic that the authors provide.
Q115 Statistics related to the primary outcome variable (if primary outcome variable is television viewing, screen time, or television viewing / screen time related)

a Value of statistic(s) in the intervention group
   Record the value of the statistic(s) provided for the intervention group. Record the value of the statistic at all data collection time points (e.g., record mean at baseline and follow-up). Include any additional information related to the statistic that was provided (e.g., n in each group).

b Value of statistic(s) in the comparison / control group
   Record the value of the statistic(s) provided for the comparison/control group. Record the value of the statistic at all data collection time points (e.g., record mean at baseline and follow-up). Include any additional information related to the statistic that was provided (e.g., n in each group).

c Value of the overall statistic(s)
   Record the value of the statistic(s) used to compare the two groups (e.g., the F-value and p-value from an ANOVA). Also include sample sizes and/or degrees of freedom.
DATA COLLECTION INSTRUMENT PAGE 25

Q116 Key variable(s) that intervention effectiveness varies by
Note all variables by circling the letter next to each for which the intervention results vary. You may select more than one variable if appropriate. If the intervention varies by a variable not listed, circle e and complete Q116es by writing the name of the variable that the intervention effectiveness varies by on the line provided.

a  Gender  c  Age
b  Race  d  Education
e  Other
(specify) ____________________________

If the authors do not specify that the intervention varies by a specific variable select “f None specified”

f  None specified

Q117 Notes
In the ‘Notes’ section describe how the results varied for the variable (e.g., significant changes were found among males but not females).
DATA COLLECTION INSTRUMENT PAGE 28 - Quality Assessment*

For each of the questions select the appropriate answer. Use the blank space next to the questions to provide clarifying information especially page numbers where the information used to determine the answer to the question was found. Provide information in the space next to the question to support your answer.

Q118 Random generation of allocation (assignment) to groups
Select the appropriate answer.

0 No 1 Yes 7 Unclear 9 Not applicable

If random allocation of subject was conducted select "yes". In the blank space next to the answer provide the page in the document or the data collection sheet where the information was found. If 'Yes' explicitly state how random allocation was achieved (e.g., use computer-generated random numbers, random number tables, drawing lots or envelopes, coin tossing, shuffling cards or throwing dice).

Q119 Allocation concealment
Select the appropriate answer.

0 No 1 Yes 7 Unclear 9 Not applicable

If the researchers and/or participants can not foresee how the assignment was made select "yes". In the blank space next to the answer provide the page in the document or the data collection sheet where the information was found.

Allocation - the assignment of a participant (individual or group) to one of the conditions of a study, such as an intervention, comparison, or control condition.

Allocation concealment - the researchers and/or participants can not foresee how the assignment was made.

Q120 Avoidance of performance bias
Select the appropriate answer.

0 No 1 Yes 7 Unclear 9 Not applicable

If there was not a difference in how the groups were treated other than that intended (i.e., the intervention) select 'yes'. In the blank space next to the answer provide the page in the document or the data collection sheet where the information was found.

Bias - systematic error in an estimation or inference; produces a consistent over- or under-estimation of effects

Performance bias - systematic differences in the care provided to groups apart from the interventions under investigation (e.g., expectancy effects, additional enhancements, or contamination of treatments)

Avoidance of performance bias - there were no treatment differences between groups other than the main intervention contrasts

*The assessment tool was taken from Litell et al (2008) Systematic Reviews and Meta-Analysis. Oxford University Press; unless otherwise noted, all definitions provide were copied from Litell et. al (2008).
Q121 Avoidance of attrition bias
Select the appropriate answer.
0 No 1 Yes for some outcomes 2 Yes for all outcomes 7 Unclear 9 Not applicable

Select yes if the losses to follow-up were less than or equal to 20% and equally distributed between comparison groups. If attrition bias was NOT avoided for all outcomes, note which outcomes were impacted in attrition bias in the space next to the response options. In the blank space next to the answer provided the page in the document or the data collection sheet where the information was found.

Attrition bias - systematic differences between participants who remain in treatment and those who drop out; systematic differences between those who continue in the study and those who withdraw; systematic differences between the treatment and control/comparison groups in dropouts or withdraw that alter the original composition of the groups

DATA COLLECTION INSTRUMENT PAGE 27

Q122 Avoidance of detection bias
Select the appropriate answer.
0 No 1 Yes for some outcomes 2 Yes for all outcomes 7 Unclear 9 Not applicable

Select yes if the assessor is unaware of the assigned treatment when collecting outcome measures. If detection bias was NOT avoided for all outcomes, note which outcomes were impacted by detection bias in the space next to the response options. In the blank space next to the answer provided the page in the document or the data collection sheet where the information was found.

Detection bias - systematic differences between groups in the collection of outcome data

Q123 Intention to treat
Select the appropriate answer.
0 No 1 Yes for some outcomes 2 Yes for all outcomes 7 Unclear 9 Not applicable

Select ‘yes’ in data were analyzed according to assigned group whether or not assigned services were received or completed. In the blank space next to the answer provided the page in the document or the data collection sheet where the information was found. Not the imputation strategy used in the intention to treat analysis.

Intention to treat - analysis of experimental data in which participants remain in the group to which they were originally assigned, regardless of whether they received that treatment.

Q124 Standard observation periods
Select the appropriate answer.
0 No 1 Yes for some outcomes 2 Yes for all outcomes 7 Unclear 9 Not applicable

Select ‘yes’ if follow-up data were collected for each case at a fixed point in time after random assignment. In the blank space next to the answer provided the page in the document or the data collection sheet where the information was found.
Q125 Validated outcomes measures
Select the appropriate answer.
0 No 1 Yes for some outcomes 2 Yes for all outcomes 7 Unclear 9 Not applicable

Select ‘yes’ if an instruments with demonstrated reliability and validity in this sample or similar samples was used or if the study used public agency administrative data, behavioral, or biologic measures. In the blank space next to the answer provided the page in the document or the data collection sheet where the information was found.

DATA COLLECTION INSTRUMENT PAGE 28

Q126 Conflicts of interest - researchers or data collectors would benefit if results favored intervention or control group
Select the appropriate answer.
1 Conflict of interest is unlikely (explain)
2 Possible conflict of interest (explain)
3 Clear conflict of interest (explain)
7 Unclear
9 Not applicable

Q126a Explain conflict of interest
Provide information about the conflict of interest (e.g., the author received financial incentives to test the intervention; the study was funded by the company that developed the device which was used to restrict access to the television).

Q127 Allegiance bias
Select the appropriate answer.
0 No 1 Yes 7 Unclear 9 Not applicable

Select ‘yes’ if there is any indication that the researchers believed that the intervention was better/worse than the alternatives before the study began. In the blank space next to the answer provided the page in the document or the data collection sheet where the information was found.

Q127a Explain allegiance bias
Record all information that was provided which indicated the author(s) believed the intervention was better/worse than the alternative before the study

DATA COLLECTION INSTRUMENT PAGE 29

Q128 General Comments
Provide any other information that may explain the study results, further describe the intervention, or provide information about the quality of the study design.

Provide any additional information about the study that will help assess or explain the quality of the work.

Q129 Notes about next steps
Provide information about next steps that may need to occur (e.g., contact study authors for additional data; available data does not allow for calculation of effect measure).
References


Meta-analysis Data Collection Instrument

Television Viewing Intervention Systematic Review Data Collection Sheet

Rev  Reviewer ____________________________________________________________

Date  Date reviewed ____________________________________________________

Ref  First Author and Publication Date ________________________________

NOTE - Title of Reference, Source, and Retrieval Method (can be found in EndNote database) - merge into data file by UI

UI  Unique Identifier: ___________

Pub  Type of Publication

1  Peer reviewed journal article
2  Thesis / Dissertation
3  Unpublished manuscript other than a thesis / dissertation

Pubs  4 Other (specify) ___________________________________________________________________

Inc  Inclusion criteria

a  Describes the results of an intervention / is an impact evaluation of an intervention
b  Intervention modifies television viewing/screen time behavior(s)
c  Television viewing/screen time behavior is the primary outcome of the intervention
d  Television viewing/screen time behavior is a secondary or intermediary outcome of the intervention

Incl_ds  Note primary outcome: __________________________________________

  e  Goal of the intervention to change behavior in children (≤18 years old)

Excl  Exclusion criteria

a  Document does not describe the results or evaluation of an intervention or describes a process evaluation (and results)
b  Television viewing/screen time behavior is not measured / is not an outcome of the intervention
c  Document written in language other than English
d  Goal of the intervention is to change behavior in adults (≥ 19 years old)
  e  Article is outside of the date range (prior to 1986)
Study Design

Randomization

Q1  Sample selection
    1  Random selection  0  Non-random selection  7  Unclear/not specified

Q1s  Describe sample selection process

Q2  Group assignment
    1  Random assignment  0  Non-random assignment
    7  Unclear/not specified  9  Not applicable

Q2s  Describe group assignment process

Q3  Number of groups

Q4  Comparison Group Used
    0  None  2  Control group
    1  Self as control  3  Comparison group

Q4s  4  Other (specify)

Q4a  Description of control/comparison group treatment
Q5 Research design

Single group design
1 pretest - post test design
2 interrupted time series design

Multiple group design
3 two group design – posttest only
4 two group design – pretest / posttest
5 multi-group post test design
6 multi-group pre-post test design
7 interrupted time series
8 multi-group interrupted time series design

Q6 Other (specify)

Q6 Notes
## Study Sample

<table>
<thead>
<tr>
<th>Q7-Q14</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q7</td>
<td>Sample Size used in analysis</td>
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<tr>
<td></td>
<td>Group</td>
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<tr>
<td></td>
<td>Intervention</td>
</tr>
<tr>
<td>Q8</td>
<td>Number started intervention</td>
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<tr>
<td>Q9</td>
<td>Number completed intervention</td>
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<td>Q10</td>
<td>Number completed post data collection</td>
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<td>Number completed follow-up data collection</td>
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<td>Q15 - Q22</td>
<td>Sample Characteristics</td>
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<td>------------------------</td>
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<tr>
<td>Q15.1</td>
<td>Age (mean &amp; SD)</td>
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<tr>
<td>Q16</td>
<td>Age range</td>
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<td></td>
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<tr>
<td>Q17.1</td>
<td>Race % Hispanic</td>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Q17.2</td>
<td>Race % white</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>Q17.3</td>
<td>Race % black</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Q17.4</td>
<td>Race % other</td>
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<td></td>
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<tr>
<td>Q18</td>
<td>Gender % male</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Q22</td>
<td>Country</td>
</tr>
<tr>
<td></td>
<td>1 US 2 non-US</td>
</tr>
<tr>
<td>Q22</td>
<td>Specify country if non-US</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>Q23 - Q27 Anthropometric characteristics</td>
<td>Intervention group</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><strong>Q23</strong> Height (mean &amp; SD)</td>
<td>a</td>
</tr>
<tr>
<td>Height - unit of measure</td>
<td></td>
</tr>
<tr>
<td>1 inches</td>
<td>4 meters</td>
</tr>
<tr>
<td>2 feet</td>
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<tr>
<td>3 centimeters</td>
<td>9999 NA</td>
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<tr>
<td><strong>Q24</strong> Weight (mean &amp; SD)</td>
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<tr>
<td>Weight - unit of measure</td>
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<tr>
<td>7777 unclear / not specified</td>
<td>9999 NA</td>
</tr>
<tr>
<td><strong>Q24.1</strong> Weight - unit of measure</td>
<td>a</td>
</tr>
<tr>
<td>1 pounds</td>
<td>7777 unclear / not specified</td>
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<tr>
<td>2 kilograms</td>
<td>9999 NA</td>
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<tr>
<td><strong>Q24.2</strong> BMI (mean &amp; SD)</td>
<td>a</td>
</tr>
<tr>
<td><strong>Q25</strong> WHR (waist to hip ratio)</td>
<td>a</td>
</tr>
<tr>
<td><strong>Q26</strong> % overweight</td>
<td>a</td>
</tr>
<tr>
<td><strong>Q26.1</strong> % overweight - how defined</td>
<td>a</td>
</tr>
<tr>
<td>(e.g., &gt;85th percentile)</td>
<td></td>
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<tr>
<td><strong>Q27</strong> % body fat</td>
<td>a</td>
</tr>
<tr>
<td><strong>Q27.1</strong> % body fat - prediction</td>
<td>a</td>
</tr>
<tr>
<td>equation</td>
<td></td>
</tr>
</tbody>
</table>
Q28 Notes - Note anything else about the sample.

Q28a Were the groups statistically (p ≤ 0.05) different at baseline?

1 Yes 0 No 7777 Don't Know / not specified 9999 Not-applicable

Q28b Describe significant differences between groups at baseline:
UI  Unique Identifier

**Intervention**

Q29  Name of Intervention

Q29a  Description of Intervention
Q30  Theory Used in Developing the Intervention (circle all that apply)

0  None specified
1  Self-Efficacy Theory
2  Social Cognitive Theory
3  Health Belief Model
4  Transtheoretical Model
5  Theory of Reasoned Action / Theory of Planned Behavior
6  Attribution Theory
7  Ecological Model / Socio-ecological Model
8  Other
    (specify) ________________________________

Q31  Notes
### Intervention Delivery

**Q32** Setting of Intervention

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>Research lab</td>
</tr>
<tr>
<td>2</td>
<td>Community</td>
</tr>
<tr>
<td>3</td>
<td>School</td>
</tr>
<tr>
<td>4</td>
<td>Home</td>
</tr>
<tr>
<td>5</td>
<td>Health care setting</td>
</tr>
<tr>
<td>6</td>
<td>VMC clinic</td>
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**Q32s**

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<thead>
<tr>
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<tbody>
<tr>
<td>7</td>
<td>Other (specify)</td>
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</table>

7777 Unclear / not specified

**Q33** Who delivers the Intervention

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>Researcher</td>
</tr>
<tr>
<td>2</td>
<td>Trained end-user</td>
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</table>

**Q33s**

<p>| | |</p>
<table>
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<tbody>
<tr>
<td>3</td>
<td>Other (specify)</td>
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</table>

7777 Unclear / not specified

**Q34-Q35** Intervention Delivery

<table>
<thead>
<tr>
<th>Q34</th>
<th>Time period (dates of intervention)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Q35</th>
<th>Intended Frequency</th>
<th>Page</th>
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</table>

<table>
<thead>
<tr>
<th>Q36</th>
<th>Intended Duration (e.g., school year)</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>7777 Unclear / not specified</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Q37</th>
<th>Exposure (how much is received by study participants)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>7777 Unclear / not specified</td>
</tr>
</tbody>
</table>
Q38 Describe any barriers encountered during intervention delivery or evaluation

Q39 Notes
### Outcomes
Primary outcome variable

**Q40** Primary outcome
- 1 Television viewing (alone)
- 2 Screen time
- 3 Physical activity
- 4 Obesity
- 5 Eating behavior
- 6 Other (specify) ____________________________

*Select “9999-Not-applicable” for Q41 – Q44a if the primary outcome is 3- physical activity, 4—obesity, 5 – eating behavior (that is not TV related (e.g., portion size) or 6- other (that is not directly related to television (e.g., other related to TV viewing would be removing tv from bedroom)).*

**Q41** Is the primary outcome variable used in the analysis a continuous variable?
- 1 Yes
- 0 No
- 7777 Unclear / not specified
- 9999 Not-applicable

**Q42** Is the primary outcome variable used in the analysis a categorical variable?
- 1 Yes
- 0 No
- 7777 Unclear / not specified
- 9999 Not-applicable

**Q42a** If the primary outcome variable is a categorical variable was it....
- 1 collected as continuous and grouped for analyses
- 2 collected as categorical
- 3 collected as categorical and grouped for analyses
- 7777 Unclear / not specified
- 9999 Not-applicable

**Q43** How is the primary outcome measured

**Q44** Is there a range restriction in the primary outcome
- 1 Yes
- 0 No
- 7777 Unclear / not specified
- 9999 Not-applicable

**Q44a** Describe the range restriction on the primary outcome (if Q44=0 or Q44=9999 write NA below)
Secondary / intermediary outcome variable – television viewing

Q45 Is television viewing a secondary / intermediary outcomes
1 Yes - secondary  2 - Yes - intermediary  0 No – neither

Select “9999-Not-applicable” for Q46-Q49a if television viewing is NOT a secondary or intermediary outcome

Q46 Is the secondary/intermediary variable used in the analysis a continuous variable?
1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

Q47 Is the secondary/intermediary variable used in the analysis a categorical variable?
1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

Q47a If the secondary/intermediary variable is a categorical variable was it.....
1 collected as continuous and grouped for analyses
2 collected as categorical
3 collected as categorical and grouped for analyses
7777 unclear / not specified
9999 not applicable

Q48 How is the secondary/intermediary outcome measured

Q49 Is there a range restriction in the secondary/intermediary outcome
1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

Q49a Describe the range restriction on the secondary/intermediary outcome (if Q49=0 or Q49=9999 write NA below)
Secondary / intermediary outcome variable - screen time

**Q50** Is screen time a secondary / intermediary outcomes
   1 Yes - secondary  2 - Yes - intermediary  0 No – neither

*Select “9999-Not-applicable” for Q51-Q54a if screen time is NOT a secondary or intermediary outcome*

**Q51** Is the secondary/intermediary variable used in the analysis a continuous variable?
   1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

**Q52** Is the secondary/intermediary variable used in the analysis a categorical variable?
   1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

**Q52a** If the secondary/intermediary variable is a categorical variable was it.....
   1 collected as continuous and grouped for analyses
   2 collected as categorical
   3 collected as categorical and grouped for analyses
   7777 Unclear / not specified
   9999 not applicable

**Q53** How is the secondary/intermediary outcome measured

**Q54** Is there a range restriction in the secondary/intermediary outcome
   1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

**Q54a** Describe the range restriction on the secondary/intermediary outcome (if Q54=0 or Q54=9999 write NA below)
Secondary / Intermediary outcome variable – television viewing / screen time related

Q55 Is there an other secondary/intermediary outcome related to television viewing/screen time
   1 Yes - secondary  2 - Yes - intermediary  0 No - neither

Q55a Identify variable

Select 9-Not-applicable for Q56-Q59a if there is no television viewing/screen time related variable as a secondary or intermediary outcome

Q56 Is the secondary/intermediary variable used in the analysis a continuous variable?
   1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

Q57 Is the secondary/intermediary variable used in the analysis a categorical variable?
   1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

Q57a If the secondary/intermediary variable is a categorical variable was it.....
   1 collected as continuous and grouped for analyses
   2 collected as categorical
   3 collected as categorical and grouped for analyses
   7777 Unclear / not specified
   9999 Not applicable

Q58 How is the secondary/intermediary outcome measured

Q59 Is there a range restriction in the secondary/intermediary outcome
   1 Yes  0 No  7777 Unclear / not specified  9999 Not-applicable

Q59a Describe the range restriction on the secondary/intermediary outcome (if Q59=0 or Q59=9999 write NA below)
Data Collection

Q80 Time periods of data collection

Q81 Data Collection Method (e.g., self report / telephone survey)

1. Self report
2. Proxy report
3. Researcher recorded
4. Other

Q61 Method

Q62 Description of data collection tool(s).

Q62a Reference for data collection tool(s)

Q63 Was the tool used to collect the outcome data validated?

1. Yes - all tools
2. Yes - some tools
3. No - no tools
4. Unclear/not specified

Q63a Reliability and validity coefficients
**Results**

**Q64-Q75** Primary Outcome Variable is television viewing, screen time, or television viewing / screen time related

- [x] Yes (Variable)
- [ ] No (skip questions Q64 – Q76)

If television viewing, screen time, or a television viewing / screen time related variable is the primary outcome variable, select the statistic that is reported in the article. If more than one statistic is reported related to the primary outcome variable, select all that apply.

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q64</td>
<td>Mean gain score - Standardized</td>
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<td>0</td>
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<tr>
<td>Q64a</td>
<td>Mean gain score - Unstandardized</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Q64b</td>
<td>Mean, n, standard deviation, correlation between time 1 and time 2 values</td>
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<td>0</td>
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<tr>
<td>Q65</td>
<td>Unstandardized mean difference</td>
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<tr>
<td>Q65a</td>
<td>Mean, n, standard deviation</td>
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<tr>
<td>Q66</td>
<td>Standardized mean difference (Cohen’s d)</td>
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<td>Q67</td>
<td>Hedges g</td>
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<tr>
<td>Q68</td>
<td>Correlation between data measured at multiple points in time</td>
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<td>F-ratio</td>
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<tr>
<td>Q72</td>
<td>Proportion who experience event</td>
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<td>Q73</td>
<td>Odds Ratio</td>
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<tr>
<td>Q73a</td>
<td>Risk Ratio</td>
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<tr>
<td>Q74a</td>
<td>Number who experience event / number who do not experience event provided</td>
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<td>0</td>
</tr>
<tr>
<td>Q74b</td>
<td>Number who experience event / number in whole group provided</td>
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<td>0</td>
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<tr>
<td>Q75</td>
<td>Other statistic(s) provided</td>
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<td>0</td>
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</table>

Q75s  (specify) 

Record the statistical information provided about the primary outcome variable on the next page.
<table>
<thead>
<tr>
<th></th>
<th>Value of statistic(s) in the intervention group</th>
<th></th>
<th>Value of statistic(s) in the comparison / control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td></td>
<td>b</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td></td>
<td></td>
<td>Value of the Overall Statistics</td>
</tr>
</tbody>
</table>

**Q76** Statistics related to the primary outcome variable (if primary outcome variable is television viewing, screen time, or television viewing / screen time related)
Q77-Q89  Secondary / Intermediary Outcome Variable (television viewing)

☐ Yes  ☐ No (skip questions Q77 – Q89)

If television viewing is a secondary / intermediary outcome variable, select the statistic that is reported in the article. If more than one statistic is reported related to the secondary / intermediary outcome variable, select all that apply.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean gain score - Standardized</td>
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<td>0</td>
</tr>
<tr>
<td>Mean gain score - Unstandardized</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Mean, n, standard deviation, correlation between time 1 and time 2 values</td>
<td>1</td>
<td>0</td>
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<tr>
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<tr>
<td>Mean, n, standard deviation</td>
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<td>0</td>
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<tr>
<td>Standardized mean difference (Cohen's d)</td>
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<td>0</td>
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<tr>
<td>Hedges g</td>
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<td>0</td>
</tr>
<tr>
<td>Correlation between data measured at multiple points in time</td>
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<tr>
<td>p-value</td>
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<tr>
<td>t-test results</td>
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<tr>
<td>F-ratio</td>
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<tr>
<td>Proportion who experience event</td>
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</tr>
<tr>
<td>Odds Ratio</td>
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<td>0</td>
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<tr>
<td>Risk Ratio</td>
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</tr>
<tr>
<td>Number who experience event / number who do not experience event provided</td>
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<td>0</td>
</tr>
<tr>
<td>Number who experience event / number in whole group provided</td>
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</tr>
<tr>
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Record the statistical information provided about the secondary/intermediary outcome variable (television viewing) on the next page.
Statistics related to the secondary / intermediary outcome variable (if secondary / intermediary outcome variable is television viewing)

<table>
<thead>
<tr>
<th>a</th>
<th>Value of statistic(s) in the intervention group</th>
<th>b</th>
<th>Value of statistic(s) in the comparison / control group</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>c</td>
<td></td>
<td></td>
<td>Value of the Overall Statistics</td>
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UI  Unique Identifier ____________

Q90-Q102  Secondary / Intermediary Outcome Variable (screen time)
☐ Yes  ☐ No (skip questions Q90 – Q102)

If screen time is a secondary / intermediary outcome variable, select the statistic that is reported in the article. If more than one statistic is reported related to the secondary / intermediary outcome variable, select all that apply.

Q90  Mean gain score - Standardized  1 Yes  0 No
Q90a Mean gain score - Unstandardized  1 Yes  0 No
Q90b Mean, n, standard deviation, correlation between time 1 and time 2 values  1 Yes  0 No
Q91  Unstandardized mean difference  1 Yes  0 No
Q91a Mean, n, standard deviation  1 Yes  0 No
Q92  Standardized mean difference (Cohen’s d)  1 Yes  0 No
Q93  Hedges g  1 Yes  0 No
Q94  Correlation between data measured at multiple points in time  1 Yes  0 No
Q95  p-value  1 Yes  0 No
Q96  t-test results  1 Yes  0 No
Q97  F-ratio  1 Yes  0 No
Q98  Proportion who experience event  1 Yes  0 No
Q99  Odds Ratio  1 Yes  0 No
Q99a Risk Ratio  1 Yes  0 No
Q100a Number who experience event / number who do not experience event provided  1 Yes  0 No
Q100b Number who experience event / number in whole group provided  1 Yes  0 No
Q101  Other statistic(s) provided  1 Yes  0 No
Q101s  (specify) ___________________________________________________________________

Record the statistical information provided about the secondary/intermediary outcome variable (screen time) on the next page.
**Q102** Statistics related to the secondary / intermediary outcome variable (if secondary / intermediary outcome variable is screen time)

<table>
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<th>Value of statistic(s) in the comparison / control group</th>
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<tr>
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<tr>
<td>c</td>
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<td></td>
<td>Value of the Overall Statistics</td>
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</table>
Q103-Q115  Secondary / Intermediary Outcome Variable (television viewing/screen time related)

☐ Yes (Variable)  ☐ No (skip questions Q103 – Q115)

If the secondary / intermediary outcome variable is related to television viewing / screen time, select the statistic that is reported in the article. If more than one statistic is reported related to the secondary / intermediary outcome variable, select all that apply.

<table>
<thead>
<tr>
<th>Question</th>
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<tr>
<td>Q103 Mean gain score - Standardized</td>
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<tr>
<td>Q103a Mean gain score - Unstandardized</td>
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<td>Q103b Mean, n, standard deviation, correlation between time 1 and time 2 values</td>
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<td>Q104 Unstandardized mean difference</td>
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<tr>
<td>Q104a Mean, n, standard deviation</td>
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<td>Q105 Standardized mean difference (Cohen’s d)</td>
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<td>Q106 Hedges g</td>
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<td>Q107 Correlation between data measured at multiple points in time</td>
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<td>Q108 p-value</td>
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<td>Q109 t-test results</td>
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<td>Q110 F-ratio</td>
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<tr>
<td>Q111 Proportion who experience event</td>
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<td>Q112 Odds Ratio</td>
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<td>Q112a Risk Ratio</td>
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<tr>
<td>Q113a Number who experience event / number who do not experience event provided</td>
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<tr>
<td>Q113b Number who experience event / number in whole group provided</td>
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<td>Q114 Other statistic(s) provided</td>
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<tr>
<td>Q114s (specify)</td>
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</table>

Record the statistical information provided about the secondary/intermediary outcome variable (television viewing or screen time related variable) on the next page.
Q115 Statistics related to the secondary / intermediary outcome variable (if secondary / intermediary outcome variable is related to television viewing or screen time)

<table>
<thead>
<tr>
<th></th>
<th>Value of statistic(s) in the intervention group</th>
<th></th>
<th>Value of statistic(s) in the comparison / control group</th>
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</thead>
<tbody>
<tr>
<td>a</td>
<td></td>
<td>b</td>
<td></td>
</tr>
</tbody>
</table>

| c | Value of the Overall Statistics

175
Q116 Key variable(s) that intervention effectiveness varies by (circle all that apply)

- a Gender
- b Race
- c Age
- d Education
- e Other

(specify) ___________________________

- f None specified

Q117 Notes
<table>
<thead>
<tr>
<th>Q118 – Q125</th>
<th>Quality Assessment (Littell et al. 2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q118 Random generation of allocation (assignment) to groups - explicitly state use computer-generated random numbers, random number tables, drawing lots or envelopes, coin tossing, shuffling cards or throwing dice</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>Unclear</td>
</tr>
<tr>
<td>9</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Q119 Allocation concealment - participants and investigators cannot foresee assignment (e.g., randomization performed at site remote for intervention or monitored use of sequentially numbered, sealed, opaque envelopes</td>
<td></td>
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<tr>
<td>0</td>
<td>No</td>
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<tr>
<td>1</td>
<td>Yes</td>
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<tr>
<td>7</td>
<td>Unclear</td>
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<tr>
<td>9</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Q120 Avoidance of performance bias - no treatment differences between groups other than the main intervention contrasts</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>Yes</td>
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<tr>
<td>7</td>
<td>Unclear</td>
</tr>
<tr>
<td>9</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Q121 Avoidance of attrition bias - losses to follow-up less than or equal to 20% and equally distributed between comparison groups</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>No</td>
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<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>Yes for all outcomes</td>
</tr>
<tr>
<td>7</td>
<td>Unclear</td>
</tr>
<tr>
<td>9</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
**Q122** Avoidance of detection bias - assessor unaware of the assigned treatment when collecting outcome measures

0  No
1  Yes for some outcomes
2  Yes for all outcomes
7  Unclear
9  Not applicable

**Q123** Intention to treat - data analyzed according to assigned group whether or not assigned services were received/completed

0  No
1  Yes for some outcomes
2  Yes for all outcomes
7  Unclear
9  Not applicable

**Q124** Standard observation periods - follow-up data were collected for each case at a fixed point in time after random assignment

0  No
1  Yes for some outcomes
2  Yes for all outcomes
7  Unclear
9  Not applicable

**Q125** Validated outcomes measures - use of instruments with demonstrated reliability and validity in this sample or similar samples OR use of public agency administrative data, behavioral, or biologic measures

0  No
1  Yes for some outcomes
2  Yes for all outcomes
7  Unclear
9  Not applicable
UI Unique Identifier ______________

Q126 Conflicts of interest - researchers or data collectors would benefit if results favored intervention or control group

1 Conflict of interest is unlikely (explain)
2 Possible conflict of interest (explain)
3 Clear conflict of interest (explain)
7 Unclear
9 Not applicable

Q126a Explain conflict of interest

Q127 Allegiance bias - indication that researchers believed that the intervention was better/worse than the alternatives before the study began

0 No (explain)
1 Yes (explain)
7 Unclear (explain)
9 Not applicable (explain)

Q127a Explain allegiance bias
Q128 General comments: Provide any other information that may explain the study results, further describe the intervention, or provide information about the quality of the study design.

Q129 Notes about next steps
CHAPTER 3

STUDY 2 – A REVIEW OF STATE-BASED PROGRAMS TO CHANGE CHILDREN’S SCREEN TIME AND RECOMMENDATIONS FOR FUTURE WORK

Introduction

The prevalence of childhood and adolescent obesity has been increasing for more than 20 years (American Academy of Pediatrics - Committee on Nutrition, 2003; Coon & Tucker, 2002; Deckelbaum & Williams, 2001; National Center for Health Statistics, 2007; U.S. Department of Health and Human Services, 2001). In the United States in 2001, approximately 300,000 deaths were associated with overweight and obesity (U.S. Department of Health and Human Services, 2001) making it second to tobacco use as a cause of death (Strumpf, 2004). In 2003-2004 between 17% and 19% of children ages 2 to 19 years were overweight (National Center for Health Statistics, 2007).

Obesity is associated with an overall decreased health-related quality of life for children and adolescents (Schwimmer, Burwinkle, & Varni, 2003). Obese youth are at risk for physical problems including increased cardiovascular risk factors, type 2 diabetes, and pulmonary complications (Anderson, 2004; Ebbeling, Pawlak, & Ludwig, 2002). Obese youth also experience psychosocial problems including social isolation, teasing from family and friends, bullying behavior by other children, and are often stereotyped as unhealthy, academically unsuccessful, socially inept, unhygienic, and lazy (Dietz, 1998; Ebbeling, et al., 2002; Eisenberg, Neumark-Sztainer, & Story, 2003; Sjöberg, Nilsson, & Leppert, 2005; Strumpf, 2004). Psychological problems associated with obesity include negative self-esteem, withdrawal, depression, anxiety, feelings of
rejection, social stigmatization, discrimination, and poor body image (Deckelbaum & Williams, 2001; Eisenberg, et al., 2003; Sjöberg, et al., 2005; Strumpf, 2004; U.S. Department of Health and Human Services, 2001).

Weight is impacted by the interaction of genetic, metabolic, environmental, cultural, psychological, socioeconomic, and behavioral factors (American Academy of Pediatrics - Committee on Nutrition, 2003; Davison & Birch, 2001; U.S. Department of Health and Human Services, 2001). One behavioral factor linked to obesity is television viewing (American Academy of Pediatrics - Committee on Nutrition, 2003; Dietz & Gortmaker, 1985; Jordan & Robinson, 2008; Marshall, Biddle, Gorely, Cameron, & Murdey, 2004). Increased television has been associated with increased BMI (American Academy of Pediatrics - Committee on Nutrition, 2003). The link between television and weight status is alarming given the large proportion of children who watch TV more than two hours per day – the limit recommend by the American Academy of Pediatrics (AAP) (American Academy of Pediatrics - Committee on Nutrition, 2003; American Academy of Pediatrics Committee on Public Education, 2001). Children between the ages of 2 and 17 years spend an average of two-and-a-half hours per day watching television (Coon & Tucker, 2002) and more than 25% of youth aged 8 to 16 years report watching more than four hours per day (American Academy of Pediatrics - Committee on Nutrition, 2003). Furthermore, 24% of children between the ages of two and five years and 48% of children between the ages of 6 and 11 years have televisions in their bedrooms, a factor associated with increased television viewing (Coon & Tucker, 2002; Dennison, Erb, & Jenkins, 2002), and also discouraged by the AAP.
Recently, there has been an increase in the number of studies aimed at changing children’s screen time (primarily aimed at reducing children’s television viewing behavior) (see Study 1 for an overview of existing programs). Prior to 1985 when Dietz and Gortmaker published their article linking television viewing to obesity (Dietz & Gortmaker, 1985) only a few case studies focusing on changing children’s screen media use were published (Jason, 1985; Jason & Rooney-Rebeck, 1984). In the past two years alone, several interventions that attempt to modify children’s screen time have been published (Chin, Singh, Brug, & van Mechelen, 2008; Eisenmann et al., 2008; Epstein et al., 2008; Foster et al., 2008; Jones, Hoelscher, Kelder, Hergenroeder, & Sharma, 2008; Kipping, Payne, & Lawlor, 2008; Liliana Escobar-Chaves et al.; Salmon, Ball, Hume, Booth, & Crawford, 2008; Weintraub et al., 2008). In Study 1 of this dissertation, a systematic review and meta-analysis showed that overall, interventions to reduce children’s screen time have a small but significant impact. The interventions identified in the systematic review are primarily small scale interventions (see Study 1 for details) and therefore are limited in reach.

To address the national obesity epidemic, the Centers for Disease Control and Prevention (CDC) was authorized in 1999 by Congress to establish the Nutrition and Physical Activity Program to Prevent Obesity and Other Chronic Diseases. In this initiative, the CDC partnered with state health departments by providing funding to state health departments to develop coordinated state-wide efforts to reduce overweight and obesity (Hamre, Renaud, Franco, & Williams-Piehota, 2007; Yee et al., 2006). In 2004, 20 states received funding to develop capacity and infrastructure for obesity prevention by hiring staff, collecting data, building partnerships, and creating state wide obesity
prevention plans (Yee, et al., 2006). Although these efforts are aimed at addressing the obesity epidemic, they do not specifically address the information needs of childhood obesity stakeholders.

Working in conjunction with the Robert Wood Johnson Foundation and using the IOM’s conceptual framework of issues related to childhood obesity, the Public Health Informatics Institute conducted interviews to assess the information needs of childhood obesity stakeholders. Stakeholder groups included federal and state government, education, parents and families, health care professionals and organizations, industry, media, community and not-for-profit organization and researchers. A frequently mentioned concern of these stakeholders was the need for information about what programs exist that address childhood obesity and which are effective (McPhillips-Tangum, Torghele, Saartas, & Renahan-White, 2006). Studies 1 and 2 in this dissertation are designed to address that need by providing information about existing programs that target one factor related to obesity, screen time. The broader behavior of screen time was selected because the AAP recommends limiting all screen time, not just TV viewing (American Academy of Pediatrics Council on Communications and Media, 2009). While the systematic review and meta-analysis (Study 1) focused on programs developed and implemented by researchers, this study (i.e., Study 2) focused on programs that have been developed and or implemented by staff at state departments or agencies. Although several reviews of obesity prevention (Basdevant et al., 2006; Campbell, Waters, O'Meara, & Summerbell, 2001; Doak, Visscher, Renders, & Seidell, 2006; Lemmens, Oenema, Klepp, Henriksen, & Brug, 2008; Stice, Shaw, & Marti, 2006; Summerbell et al., 2005; Wofford, 2008) and physical activity interventions (Brownson et al., 2007; Dunn & Blair,
2002; Hillsdon, Foster, & Thorogood, 2005; Kahn et al., 2002; van Sluijs, McMin, & Griffin, 2007; Ward, Vaughn, McWilliams, & Hales, 2009) have been conducted, this paper is the first to describe state programs that have been developed to change children’s television viewing alone or in combination with videos/DVDs, playing video or computer games, and using a computer for purposes other than school work (collectively referred to as screen time).

Methods

Data Collection

In order to collect information about programs that have been developed and/or implemented by state agencies, an internet based survey was conducted. A brief (5-10 minute) survey was developed to collect information about characteristics of programs to modify children’s screen time and perceived barriers to program development and implementation. For the purpose of the survey, screen time referred to watching TV or videos/DVDs, playing video or computer games, and using a computer for purposes other than school work. The survey was developed specifically for this project. An initial draft of survey questions was shared with a representative from the New York State Department of Health’s Obesity Prevention Program and modifications to the survey were made based on the feedback received.

The final survey was comprised of 24 multiple choice questions and nine questions that required the respondent to provide a brief answer (e.g., “Please provide the name of the program”). The majority of the questions were designed to collect information about whether the respondent’s agency had experience developing or
implementing screen time reduction programs, how program development and implementation were funded, if a specific group was targeted by the program, and if the program was evaluated, and perceived barriers to program development and implementation.

It was hypothesized that the programs implemented by state agencies would be universal/public health prevention programs and few would have been evaluated. Universal programs are population based interventions that are designed for everyone in the eligible population (Institute of Medicine Food and Nutrition Board: Committee to Develop Criteria for Evaluating the Outcomes of Approaches to Prevent and Treat Obesity, 1995; "Obesity: preventing and managing the global epidemic. Report of a WHO consultation," 2000). Television viewing interventions with a universal orientation target a large population (e.g., TV Turn Off Week) whereas those with a selective orientation are directed at a specific group such as children in daycare settings (Institute of Medicine Food and Nutrition Board: Committee to Develop Criteria for Evaluating the Outcomes of Approaches to Prevent and Treat Obesity, 1995; "Obesity: preventing and managing the global epidemic. Report of a WHO consultation," 2000). To assess the orientation of the program a question was posed about the program’s target (Appendix 1, Question 5). One question (Appendix 1, Question 6) was designed to determine if the program was based on a specific theoretical model. It is possible that the programs implemented at the state level were designed by someone other than the survey respondent and the respondent would be unaware of the program’s theoretical basis. It is also possible that the survey respondent would not recall the theory by name. Therefore, the question developed to determine the use of theory did not state the names of theories
rather it asked about the purpose of the program and included response options that represented key theoretical constructs. Specifically, the question stated “Is the program designed to.... 1) increase children’s confidence in their ability to decrease screen time; 2) change children’s behavior by providing rewards or disincentives for screen time; 3) change children’s beliefs about screen time or decrease factors that enable screen time or increase factors that decrease screen time; 4) address different issues depending on specific characteristics of the child related to their readiness to decrease screen time; 5) change children’s intention to spend time in front of a screen by changing their beliefs and attitudes about screen time; or 6) address multiple influences on children’s screen viewing time (for example, peer and environmental influences)”. The response options corresponded to main constructs of several common health behavior theories (self-efficacy theory, social cognitive theory, health belief model, transtheoretical model, theory of reasoned action/theory of planned behavior, and the ecological model respectively (Glanz, Rimer, & Lewis, 2002; Hayden, 2009)). The survey included a question to determine if states provided funding to other entities to develop or implement screen time reduction interventions (Appendix 1, Question 13). A few survey questions asked for information about the respondents including job title and contact information. The final questions asked respondents if they would be willing to participate in a follow-up telephone interview. A copy of the full survey is provided in Appendix1.

The respondent pool was developed using a purposive sampling strategy (Schutt, 2004). Potential survey respondents were identified in several ways. Information provided on the CDC’s web-site (www.cdc.gov/obesity/stateprograms/fundedstates.html) was used to identify contacts in states currently funded by the CDC’s State-Based
Nutrition and Physical Activity Program to Prevent Obesity and Other Chronic Diseases. These individuals were targeted as potential respondents because the CDC program has multiple target areas including decreasing television viewing. State Physical Activity Coalitions representatives (www.ncppa.org/resources/coalitions/) and the National Society of Physical Activity Practitioner state coordinators (http://www.nspappph.org) were also identified as potential survey respondents. Since one proposed mechanism for television’s impact on weight is displacement of physical activity, these individuals were targeted as representatives of agencies that might be attempting to increase physical activity by decreasing sedentary behavior including screen time. Finally, an internet search was conducted to identify persons listed as program directors or managers in state departments or units with primary responsibility for child health (e.g., Department of Maternal and Child Health) to increase the respondent pool and assure each state was sent a survey invitation. Potential respondents were sent a maximum of three emails between March 11, 2010 and March 29, 2010. The initial email was sent to 116 individuals representing all 50 states. Follow-up emails were sent to non-respondents at approximately one week intervals and scheduled to be delivered at various times (the initial email was sent at 9:00 am Eastern Standard Time, the second at 9:00 am Central Standard Time, and the third at 9:00 am Pacific Standard Time). The survey and the study protocol were approved by the State University of New York at Albany’s Institutional Review Board.

Data Analysis

Survey data were downloaded into and analyzed with Excel. Since multiple individuals from a single state were sent the survey instrument, it was possible that more
than one person from each state would respond to the survey. Multiple respondents from
a single state were handled in two ways. For the purpose of quantifying the number of
states engaging in development and/or implantation of screen time interventions,
duplicate entries from a single state were excluded from the analyses. Since one of the
goals of this project was to identify perceived barriers to program development and
implementation, all responses to the question about barriers were analyzed. When the
answers from same-state respondents about program development or implantation
disagreed, the affirmative response was counted. For example, if two respondents from
one state answered the question “In the past there years, has your agency or department
developed or implanted a program that addressed children’s screen time?” differently by
one respondent choosing “Yes, developed” and “Yes, implemented” as answers and the
other selecting “No” as an answer, the “Yes” responses were included in the count of
states that developed and implemented a screen time reduction program. This allowed for
the possibility that the respondents worked for different state agencies and one agency
was involved with a program while the other was not. Descriptive analyses of the data
collected were conducted. States conducting or implementing interventions were
identified and characteristics of the interventions were summarized. Frequency
distributions of program characteristics base on responses to survey items were
calculated. A list of respondents willing to participate in a telephone interview was
compiled for use in future work.
Results

Forty-seven individuals (40%) from 36 states completed to the survey. Figure 1 illustrates the geographic distribution of states that are represented in the data (blue states) and states funded by the CDC Division of Nutrition, Physical Activity, and Obesity that are not represented in the data (yellow states). Most survey respondents self-identified as physical activity, obesity, or nutrition program coordinators and completed the survey shortly after receiving the email invitation or a follow-up reminder (Figure 2). Fifty-three percent (n= 25/47) of respondents stated they would be willing to participate in a telephone interview (47% n=22) or recommended a colleague to participate in an interview (6% n=3).

Table 1 summarizes the survey questions, response options, and response answers. provides a summary of answers provided to survey questions. More than half (n=21/36, 58%) of the states represented sponsored a screen time reduction program (10 states developed, 12 implemented, and 10 are currently implementing programs – several states have engaged in a combination of these activities). The majority (n=20/21, 95%) of programs addressed television viewing alone (n=4) or in combination with other behaviors (n=16). Sixty-two percent (n=12/21) of programs targeted computer use for non-academic purposes, 67% addressed video/DVD viewing (n=14/21), and 67% addressed video/computer game use (n=14/21). Two of the programs addressed cell phones (one cell phone use and the other playing games on cell phones). Table 2 lists the 21 states that have developed or implemented a program targeting screen time and summarizes characteristics of each program.
Seventeen (n=81%) of the 21 programs were based in theory. The majority of programs (57% n=12/21) were based on the ecological model. Respondents were given the option to respond “other” to the question about the purpose of the program (“Is the program designed to....”) and in turn, provide information about the program’s purpose. The four respondents who answered “other” to the question provided the following information about the purpose of the program: it was designed to “Encourage families to reduce or eliminate TV watching during TV Turn Off Week”, “Change childcare center behaviors and practices around screen time”, “Educate child care providers about the effects of screen time on early childhood development and give them some ideas to improve child care settings and outreach to parents”, “Encourage families to reduce or eliminate TV watching during TV Turn Off Week” or “Change policy in child care facilities as to amounts of screen time allowed daily”. Slightly less than half (n=9/21, 43%) of the programs were developed by the respondent’s agency; only one program (5%) was “developed by researchers and published in an academic journal”. Most programs were funded with federal grant money only. Several (n=3) were funded with a combination of funds (two with federal and state funding, and one with federal, state, and private funds). Only 33% (n=7) of the programs were evaluated.

Forty respondents (85%) answered the question about barriers to program development and/or implementation (Table 1). Most stated lack of money (55%, n=22) and/or time (48%, n=19) were barriers. A few respondents identified lack of evidence (13% n=5) or information (10%, n=4) as barriers. Examples of the perception that information is lacking are the following qualitative responses provided by survey respondents: “There are not enough models out there for effective evidence-based
programs at the state level” and “.....Also there are not clear cut programs developed that health departments could use readily”. Other barriers cited included the need for information about how to implement such a program (“We aren't clear on how we would carry out such a program beyond a media campaign. We don't work directly with individuals and we haven't identified a likely group to implement such a program”) and a focus on policy not programming (“Our focus now is policy vs. programming” and “Developing a program to directly affect individual behavior is not the scope of our work. However, our initiative focuses on policy and environmental change to support a change in television viewing behavior”).

Discussion

The intent of this study was to develop a compendium of programs that have been developed and/or implemented by state departments or agencies to modify children’s screen time. A single document describing existing programs and providing the name of a person who can be contacted for additional information or another means of accessing information about the program will help fill the information gap that has been identified by other (McPhillips-Tangum, et al., 2006) and described here.

Based on the available information, 21 states have developed and/or implemented interventions to modify screen time. This is almost double the number that were engaged in the activity in 2004 (Yee, et al., 2006). Since a representative from all states did not complete the survey, it is possible that more states have developed or implemented screen time interventions but are not represented in this work. Although only 40% of potential respondents completed the survey, these individuals represented 72% (n=36/50) of
states. This response rate is similar to that seen in other studies - two meta-analyses of on-line surveys found average response rates of 33% across 35 studies (Shih & Fan, 2009) and 40% across 68 surveys (Cook, Heath, & Thompson, 2000). Because some of the respondents received more than one survey invitation (e.g., an individual received an invitation directly and was also forwarded the email invitation that had been sent to a colleague), the actual response rate may have been higher if the appropriate respondent had been identified prior to sending the survey invitation.

It was hypothesized that the state level programs would be universal/population based programs that target a broad group and would not have been evaluated. This was true for the majority of interventions; few were evaluated and the majority were of large scope such as an informational campaign or a TV turnoff – strategies that are not targeted at a specific group but are designed for everyone in the population.

**Recommendations**

Although this study focused on documenting existing interventions, the interventions identified shared common characteristics, some of which are important for effective large scale interventions. Sorensen and colleagues (Sorensen, Emmons, Hunt, & Johnston, 1998) suggest that population level interventions should target multiple levels of influence. This review found that the majority of state-level screen time interventions follow this recommendation. Several of the states represented in the survey are following the IOM’s recommendation to provide coordinated leadership and support for childhood obesity prevention efforts (Koplan, Liverman, Kraak, & Wisham, 2007) by being involved with the CDC’s Nutrition and Physical Activity Program to Prevent Obesity and
Other Chronic Diseases program and by having staff dedicated to obesity prevention related duties (e.g., physical activity or obesity prevention coordinators).

*Research translation.* Although many screen time interventions have been developed, evaluated, and shown to be successful (see Study 1 of this dissertation), only one state programs were based on interventions in the published literature. State personnel should utilize the published literature to identify effective programs and work with researchers to implement programs on a large scale whenever possible. A concentrated effort should be made to improve the translation of research into practice.

Successful adoption of health promotion programs is associated with awareness of, interest in, and concern about the issue (Steckler, Goodman, McLeroy, Davis, & Koch, 1992). Program developers should facilitate translation by increasing state program personnel’s awareness of intervention programs and increasing interest in using the programs. The less complicated and more observable the results of a program, the more likely it is to be used (Steckler, et al., 1992). Researchers should make their programs easily implementable and provide documentation to practitioners to allow for implementation of the program with the greatest ease and fidelity. Several other factors can increase adoption including the option to implement programs on a trial basis, the similarity between the new program and existing programs and practices that are in use or have been used, and the perception that the proposed program is superior to existing programs (Steckler, et al., 1992). To facilitate evaluation of programs in various settings, researchers could develop evaluation tools for use with their programs or with existing large scale programs. Researchers should keep in mind that the end-point of public health programs is population health improvement (Ogilvie, Craig, Griffin, Macintyre, &
Wareham, 2009) and that evaluation metrics should be developed to assess the long term impact of interventions on a large scale. Researchers and practitioners must remember results may not occur quickly and that population health surveillance and descriptive epidemiology of the health conditions of interest need to be incorporated into program evaluation and become part of a feedback loop (Ogilvie, et al., 2009) to modify existing programs and inform development of new programs.

As noted in relation to medical research “what is efficacious in randomized clinical trials is not always effective in the real world...” (Westfall, Mold, & Fagnan, 2007). This may also be the case in regard to public health interventions. The programs that are developed by researchers and tested in a controlled setting may not be best suited for large scale public health implementation. Interventions are often tested in a controlled setting and statistical methods used to control for variations – the resulting evidence which is often given the most weight in evidence based practice decision making is often not tested in practice (Green, 2006). Researchers should strive to develop programs with high generalizability and external validity. They should partner with public health professionals to develop and modify interventions, and should develop evaluation plans to test generalizability, implementation, reach, and effectiveness. Practitioners and other stakeholders should be engaged in the research and evaluation process so they may bring their intuition, which fosters the discovery of patterns in empirical data, to the intervention development and evaluation process (Green, 2006). Researchers and practitioners should also work together to develop and implement policy and environmental interventions which are generally designed with a broad audience in mind. To successfully implement evidence based approaches several needs must be met:
scientific information must be available; information from research must be married with the realities of practice; and wide-scale dissemination of effective interventions must occur (Brownson, Fielding, & Maylahn, 2009).

**Targeted program development.** Few of the programs identified in this review address older children or non-white children specifically. Large scale interventions should attempt to target non-white children since they exhibit both greater media use and higher rates of obesity than white children (Ogden et al., 2006). Across all types of media (TV, music, computers, videogames) African American and Hispanic youth and children between the ages of 11 and 14 and 15 and 18 respectively are heaviest users (Rideout, Foehr, & Roberts, 2010). Only one state program specifically targeted non-white children. Additionally, although the majority of children own cell phones, iPods/MP3 players, and video game players (66%, 76%, 59% respectively) and roughly 40% of children’s television watching occurs on something other than a television set (e.g., computer) (Rideout, et al., 2010) only two programs included in this review focuses on cell phones.

**Policy level interventions.** Nationally, children in almost 90% of home-based child care settings and 35% of center-based care setting regularly watch television (Christakis, Garrison, & Zimmerman, 2006). Several programs identified in this review targeted child care facilities. To address screen time in child care settings, state agencies could develop programs or policies that specifically address the issue. During 2003 to 2005, 17% of the childhood obesity bills that were introduced in state legislatures were enacted. Although low, this does not differ from the overall bill enactment rate (Boehmer, Luke, Haire-Joshu, Bates, & Brownson, 2008) making obesity specific legislation a
viable option. Although policy level interventions can be effective and can impact many, they should not be implemented in isolation. Since much of children’s television viewing occurs in the home, policy interventions should be coupled with behavioral interventions to maximize impact.

*Sustainability.* As would be expected, a lack of time and money was cited by many respondents as reasons for not developing or implementing programs. Combined with the information that the most frequently cited source of funding for the programs included in this review was federal grants, this supports the need for continued funding by the federal government for state programs. The CDC’s State-Based Nutrition and Physical Activity Program to Prevent Obesity and Other Chronic Diseases (Center for Disease Control and Prevention, 2008) is an example of how federal funding can encourage program development and implementation at the state level (Hamre, et al., 2007; Yee, et al., 2006). A review of local programs that were successfully sustained after funding ending identified several characteristic that are relevant for state programs including a) having organization sponsorship b) utilizing expertise of host organization, c) strategic planning, d) diversified funding, e) public recognition, and e) public awareness (Stevens & Peikes, 2006). State programs should incorporate these characteristics into their operations whenever possible to increase the chance of sustaining programs at the conclusion of funding.

*Future work*

The author plans to conduct follow-up interviews with survey respondents who expressed willingness to participate in a phone interview. A semi-structured interview format (Patton & Patton, 1990) will be used to collect detailed information about the
programs included in this review. The interviews will also be used to collect information about program development and implementation. Interviewees will also be asked to describe challenges faced during program development and / or implementation and strategies that were used to overcome those challenges. As funding streams dry up, it will be important for states to spend their limited funds carefully. To that end, future work should focus on increasing the number of state programs that are evidence based and evaluated.

Acknowledgements

The author would like to thank the state program personnel who responded to the survey or sent an email in response to the survey invitation.


Deckelbaum, R. J., & Williams, C. L. (2001). Childhood obesity: The health issue. *Obesity Research, 9*(Suppl. 4), 239S-243S.


Eisenmann, J. C., Gentile, D. A., Welk, G. J., Callahan, R., Strickland, S., Walsh, M., et al. (2008). SWITCH: rationale, design, and implementation of a community,


Table 1: Responses to survey questions (frequency and percent of total).

<table>
<thead>
<tr>
<th>Survey Question (total responses)</th>
<th>Response Option</th>
<th>Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the past three years, has your agency or department developed or implemented a program that addresses children’s screen time? (n=36 states)</td>
<td>Developed or implemented a program</td>
<td>21 (58)</td>
</tr>
<tr>
<td></td>
<td>Yes, developed</td>
<td>10 (28)</td>
</tr>
<tr>
<td></td>
<td>Yes, implemented</td>
<td>12 (33)</td>
</tr>
<tr>
<td></td>
<td>Yes, currently implementing</td>
<td>10 (28)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>15 (42)</td>
</tr>
<tr>
<td>Which of the following does the program address? (select all that apply) (n=21 programs)</td>
<td>Television viewing</td>
<td>20 (95)</td>
</tr>
<tr>
<td></td>
<td>Video and/or DVD viewing</td>
<td>14 (67)</td>
</tr>
<tr>
<td></td>
<td>Video game and/or computer game use</td>
<td>14 (67)</td>
</tr>
<tr>
<td></td>
<td>Computer use for non-educational purposes</td>
<td>13 (62)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>5 (24)</td>
</tr>
<tr>
<td>Does the program target a specific group of youth? (please select all that apply) (n=21 programs)</td>
<td>No – the program targets all children</td>
<td>6 (29)</td>
</tr>
<tr>
<td></td>
<td>Yes - children younger than age 5 years</td>
<td>6 (29)</td>
</tr>
<tr>
<td></td>
<td>Yes - children ages 5 – 10 years</td>
<td>7 (33)</td>
</tr>
<tr>
<td></td>
<td>Yes - children ages 11 – 15 years</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>Yes - children ages 16 – 18 years</td>
<td>1 (5)</td>
</tr>
<tr>
<td></td>
<td>Yes - overweight or obese children</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>Yes - children who watch too much television</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>Yes - non-white children</td>
<td>1 (5)</td>
</tr>
<tr>
<td></td>
<td>Yes - other</td>
<td>5 (24)</td>
</tr>
<tr>
<td>Survey Question (total responses)</td>
<td>Response Option</td>
<td>Count (%)</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Is the program designed to ……… (check all that apply) (n=21 programs)</td>
<td>increase children’s confidence in their ability to decrease screen time (Self-Efficacy Theory)</td>
<td>4 (19)</td>
</tr>
<tr>
<td></td>
<td>change children’s behavior by providing rewards or disincentives for screen time (Social Cognitive Theory)</td>
<td>4 (19)</td>
</tr>
<tr>
<td></td>
<td>change children’s beliefs about screen time or decrease factors that enable screen time or increase factors that decrease screen time (Health Belief Model)</td>
<td>7 (33)</td>
</tr>
<tr>
<td></td>
<td>address different issues depending on specific characteristics of the child related to their readiness to decrease screen time (Transtheoretical Model)</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>change children’s intention to spend time in front of a screen by changing their beliefs and attitudes about screen time (Theory of Reasoned Action/Theory of Planned Behavior)</td>
<td>8 (38)</td>
</tr>
<tr>
<td></td>
<td>address multiple influences on children’s screen viewing time (for example, peer and environmental influences) (Ecological Model)</td>
<td>12 (57)</td>
</tr>
<tr>
<td>The program was based on a theory</td>
<td></td>
<td>17 (81)</td>
</tr>
<tr>
<td>Who developed the program? (n=21 programs)</td>
<td>The program was developed by my department/agency</td>
<td>9 (43)</td>
</tr>
<tr>
<td></td>
<td>The program was developed by researchers and was published in an academic journal</td>
<td>1 (5)</td>
</tr>
<tr>
<td>How was development of the program funded? (select all that apply) (n=21 programs)</td>
<td>Grant from a federal government agency (e.g., CDC)</td>
<td>9 (43)</td>
</tr>
<tr>
<td></td>
<td>Grant from a private agency</td>
<td>1 (5)</td>
</tr>
<tr>
<td></td>
<td>State budget</td>
<td>4 (19)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>6 (29)</td>
</tr>
<tr>
<td>Survey Question (total responses)</td>
<td>Response Option</td>
<td>Count (%)</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>If you have implemented a program in the past three years, how was the program funded? (select all that apply) (n=21 programs)</td>
<td>Grant from a federal government agency (e.g., CDC)</td>
<td>11 (52)</td>
</tr>
<tr>
<td></td>
<td>Grant from a private agency</td>
<td>2 (10)</td>
</tr>
<tr>
<td></td>
<td>State budget</td>
<td>4 (19)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>3 (14)</td>
</tr>
<tr>
<td></td>
<td>We have not implemented a program in the past three years</td>
<td>3 (14)</td>
</tr>
<tr>
<td>Has your agency evaluated the program? (n=21 programs)</td>
<td>Yes</td>
<td>7 (33)</td>
</tr>
<tr>
<td>Provided funding to another (n=21 programs)</td>
<td>Response</td>
<td>4 (19)</td>
</tr>
<tr>
<td>Please check the reasons why your agency has not developed or implemented a program to address children’s screen time. (please select all that apply) (n=40 respondents)</td>
<td>There is not yet a strong enough case to support such a program</td>
<td>5 (13)</td>
</tr>
<tr>
<td></td>
<td>There is not enough information available to develop such a program</td>
<td>4 (10)</td>
</tr>
<tr>
<td></td>
<td>We do not have enough money</td>
<td>22 (55)</td>
</tr>
<tr>
<td></td>
<td>We do not have enough time</td>
<td>19 (48)</td>
</tr>
<tr>
<td></td>
<td>We do not have the expertise</td>
<td>3 (8)</td>
</tr>
<tr>
<td></td>
<td>We don’t know who to contact for assistance</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>Too big of a task / we serve too large of a population</td>
<td>4 (10)</td>
</tr>
<tr>
<td></td>
<td>It is not our job to develop such a program</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>The population we serve is not interested in such a program</td>
<td>1 (3)</td>
</tr>
<tr>
<td></td>
<td>The agency is not interested in such a program</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>16 (40)</td>
</tr>
<tr>
<td>Would you be willing to share your opinions and ideas in a short phone interview with us? (n=47 respondents)</td>
<td>Yes</td>
<td>22 (47)</td>
</tr>
<tr>
<td></td>
<td>Yes, but you should really talk to one of my colleagues about this</td>
<td>3 (6)</td>
</tr>
<tr>
<td></td>
<td>No thank you</td>
<td>16 (34)</td>
</tr>
</tbody>
</table>
Table 2: Information about state programs to modify children’s screen time and state program contact persons.

<table>
<thead>
<tr>
<th>State</th>
<th>Name of the program</th>
<th>Which of the following does the program address? (select all that apply)</th>
<th>Does the program target a specific group of youth?</th>
<th>Theoretical basis: Is the program designed to … (check all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*AR</td>
<td>Turn Off Screen Time Week</td>
<td>computers, games, TV, video/DVD</td>
<td>all</td>
<td>EST, HBM, SCT, SET, TRA/TPB, TTM</td>
</tr>
<tr>
<td></td>
<td>Leesa Freasier, Physical Activity Section Chief</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4815 W. Markham, Little Rock, AR 72205</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><a href="mailto:leesa.freasier@arkansas.gov">leesa.freasier@arkansas.gov</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>501-280-4915</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZ</td>
<td>Empower</td>
<td>computers, games, TV, video/DVD</td>
<td>Children infant – school age in childcare centers</td>
<td>EST, Change childcare center behaviors and practices around screen time</td>
</tr>
<tr>
<td></td>
<td>Adrienne Z. Udarbe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Community Programs Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>150 N. 18th Ave. Ste. 310, Phoenix, AZ 85007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><a href="mailto:adrienne.udarbe@azdhs.gov">adrienne.udarbe@azdhs.gov</a></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>602-364-3298</td>
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</tr>
<tr>
<td>State</td>
<td>Name of the program</td>
<td>Which of the following does the program address? (select all that apply)</td>
<td>Does the program target a specific group of youth?</td>
<td>Theoretical basis: Is the program designed to … (check all that apply)</td>
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<td>---------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>*HI</td>
<td>Olelo Youth Xchange Video Competition – Start Living Healthy category</td>
<td>computers, games, playing games on cell phones</td>
<td>5-10</td>
<td>11-15</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>Alice Malepeai Silbanuz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public &amp; Professional Education Coordinator</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>DOH Communications Office</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1250 Punchbowl St. # 326, , Honolulu, HI 96813</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><a href="mailto:alice.silbanuz@doh.hawaii.gov">alice.silbanuz@doh.hawaii.gov</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>808-586-4434</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*IA</td>
<td>Turn Off the TV Week at YMCA’s</td>
<td>TV</td>
<td>&lt;5</td>
<td>HBM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5-10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sarah Taylor, Physical Activity Coordinator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>321 E 12th Street, Des Moines, Iowa 50319</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><a href="mailto:staylor@idph.state.ia.us">staylor@idph.state.ia.us</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>515-242-6709</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>Name of the program</td>
<td>Which of the following does the program address? (select all that apply)</td>
<td>Does the program target a specific group of youth?</td>
<td>Theoretical basis: Is the program designed to … (check all that apply)</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>*IN</td>
<td>Indiana Healthy Weight Initiative</td>
<td>TV</td>
<td>all</td>
<td>EST</td>
</tr>
</tbody>
</table>

Marcie L. Memmer  
Program Coordinator of Communities and Families  
2 N. Meridian St., Indianapolis, IN 46204  
mmemmer@isdh.in.gov  
317-233-7726

KY
We paid the National Turn off TV network to do 5 statewide training on reducing screen time, distributed 15,000 books on this topic to elementary school age children, and encouraged local interventions as a follow up to the trainings games TV video/DVD all EST

MD
no information about the program was provided
<table>
<thead>
<tr>
<th>State</th>
<th>Name of the program</th>
<th>Program contract</th>
<th>Which of the following does the program address? (select all that apply)</th>
<th>Does the program target a specific group of youth?</th>
<th>Theoretical basis: Is the program designed to … (check all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME</td>
<td>We promote many programs that offer alternatives to TV/screen time and forward the recommendations of 2 hours or less in some messaging including through clinical settings with pediatricians offices, Community based interventions using similar messages and also promotes increasing healthy habits including PA.</td>
<td>computers games TV video/DVD The recommendations are generalized as screen use. Another program our schools use is TV off week</td>
<td>all</td>
<td>EST</td>
<td></td>
</tr>
<tr>
<td>*MI</td>
<td>Brocodile the Crocodile</td>
<td>TV</td>
<td>&lt;5</td>
<td>EST HBM SET TRA/TPB</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>Name of the program</td>
<td>Program contract</td>
<td>Which of the following does the program address? (select all that apply)</td>
<td>Does the program target a specific group of youth?</td>
<td>Theoretical basis: Is the program designed to … (check all that apply)</td>
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</tr>
<tr>
<td>MT</td>
<td>Young Children Growing Up in the Digital Age</td>
<td>computers, games, TV, video/DVD</td>
<td>Birth to 1 years old...but primarily children in child care settings (so they could be older)</td>
<td>educate child care providers about the effects of screen time on early childhood development and give them some ideas to improve child care settings and outreach to parents</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(online course for child care providers)</td>
<td></td>
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<tr>
<td>*NE</td>
<td>Nebraska Youth Physical Activity and Nutrition Assessment Form and the Foster Healthy Weight in Youth - Nebraska's Childhood Obesity Model</td>
<td>Screen Time TV</td>
<td>Children ages 1-18</td>
<td>TRA/TPB</td>
<td></td>
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<tr>
<td></td>
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<tr>
<td>State</td>
<td>Name of the program</td>
<td>Program contract</td>
<td>Which of the following does the program address? (select all that apply)</td>
<td>Does the program target a specific group of youth?</td>
<td>Theoretical basis: Is the program designed to … (check all that apply)</td>
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<td>-------------------------------------------------</td>
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</tr>
<tr>
<td>*NH</td>
<td>We promoted TV turn off week though our KidPower! newsletter.</td>
<td>games TV video/DVD</td>
<td>5-10</td>
<td>Encourage families to reduce or eliminate TV watching during TV Turn Off Week</td>
<td></td>
</tr>
<tr>
<td>*NJ</td>
<td>Childcare training and licensing initiative w ARRA funding</td>
<td>computers TV</td>
<td>&lt;5</td>
<td>EST</td>
<td></td>
</tr>
<tr>
<td>*NM</td>
<td>It is part of our Fitness and Nutrition 5.2.1.0 Campaign</td>
<td>computers games TV video/DVD</td>
<td>5-10 non-wh</td>
<td>SCT</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>Name of the program</td>
<td>Which of the following does the program address? (select all that apply)</td>
<td>Does the program target a specific group of youth?</td>
<td>Theoretical basis: Is the program designed to … (check all that apply)</td>
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<tr>
<td>NY</td>
<td>Media Reduction Module, an add-on to the Nutrition and Physical Activity Self Assessment for Child Care.</td>
<td>computers, games, TV, video/DVD</td>
<td>This is an assessment tool for use in the child care setting of young children and information for child care staff as gatekeepers of that setting.</td>
<td>EST 217</td>
<td></td>
</tr>
<tr>
<td>NY</td>
<td>Kyle Restina, Coordinator Obesity Prevention Program, NYS Department of Health, Riverview Center, 150 Broadway - Room 350, Albany, NY 12204, <a href="mailto:krr01@health.state.ny.us">krr01@health.state.ny.us</a>, 518-408-5142</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OK</td>
<td>Move More, Watch Less</td>
<td>cell phones, computers, games, TV, video/DVD</td>
<td>5-10</td>
<td>TRA/TPB</td>
<td></td>
</tr>
<tr>
<td>OK</td>
<td>Matt Jacobs, Physical Activity Coordinator, 1000 NE 10th Street, OKC, OK 73117, <a href="mailto:mattj@health.ok.gov">mattj@health.ok.gov</a>, 405-271-4072</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>State</td>
<td>Name of the program</td>
<td>Which of the following does the program address? (select all that apply)</td>
<td>Does the program target a specific group of youth?</td>
<td>Theoretical basis: Is the program designed to … (check all that apply)</td>
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<td>--------------------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
<td>------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>*SC</td>
<td>Families Eating Smart &amp; Moving More NAP SACC</td>
<td>TV, &lt;5, 5-10</td>
<td></td>
<td>EST</td>
<td></td>
</tr>
<tr>
<td>*TN</td>
<td>Gold Sneaker Initiative</td>
<td>all visual recordings, computers, games, screen time, TV, video/DVDTV</td>
<td>&lt;5</td>
<td>Change policy in child care facilities as to amounts of screen time allowed daily</td>
<td></td>
</tr>
<tr>
<td>*UT</td>
<td>Unplug’n’Play</td>
<td>computers, games, TV, video/DVD</td>
<td>all</td>
<td>HBM, TRA/TPB</td>
<td></td>
</tr>
</tbody>
</table>

Brett McIff, Physical Activity Coordinator
Utah Dept. of Health, PO Box 142107
Salt Lake City, UT 84114-2107
bmciff@utah.gov
801-538-9362
<table>
<thead>
<tr>
<th>State</th>
<th>Name of the program</th>
<th>Which of the following does the program address? (select all that apply)</th>
<th>Does the program target a specific group of youth?</th>
<th>Theoretical basis: Is the program designed to … (check all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT</td>
<td>Fit and Healthy Kids Spring/Fall Challenge</td>
<td>computers, games, TV, video/DVD</td>
<td>all</td>
<td>EST, HBM, SCT, SET, TRA/TPB</td>
</tr>
<tr>
<td></td>
<td>Suzanne Kelley, MSW, Physical Activity Coordinator</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>VT Dept of Health, 108 Cherry St., PO Box 70</td>
<td></td>
<td></td>
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<td></td>
<td>Burlington, VT 05402</td>
<td></td>
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<td></td>
<td><a href="mailto:Skelley@vdh.state.vt.us">Skelley@vdh.state.vt.us</a></td>
<td></td>
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<tr>
<td></td>
<td>802-657-4202</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*WA</td>
<td>Washington Active Bodies, Active Minds (WAABAM) (for those caring for children under 5)</td>
<td>computers, games, TV, video/DVD</td>
<td>&lt;5, 5-10, 11-15</td>
<td>EST, HBM, SET, TRA/TPB</td>
</tr>
<tr>
<td></td>
<td>Screen TIME matters (School-aged provider audience, like after school and summer providers)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Powerful Choices (3rd-5th grade Student audience)</td>
<td></td>
<td></td>
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<td></td>
<td>Donna B Johnson, Associate Director</td>
<td></td>
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<td></td>
<td>Center for Public Health Nutrition</td>
<td></td>
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<tr>
<td></td>
<td>University of Washington, Box 353410</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Seattle, WA 98195</td>
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<tr>
<td></td>
<td><a href="mailto:Djohn@uw.edu">Djohn@uw.edu</a></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
*State is funded by the CDC’s Division of Nutrition, Physical Activity, and Obesity

Behavior addressed: TV=Television viewing; video/DVD = Video and/or DVD viewing; games = Video game and/or computer game use;
            computers = Computer use for non-educational purposes

Target: all = No – the program targets all children; < 5= Yes - children younger than age 5 years; 5-10 = Yes - children ages 5 – 10 years; 11-15=Yes - children ages 11-15 years; 16-18 = Yes - children ages 16-18 years; non-wh= Yes - non-white children

Theoretical basis: SET – Self-efficacy Theory; SCT – Social Cognitive Theory; HBM – Health Belief Model; TTM – Transtheoretical Model;
            TRA/TPB – Theory of Reasoned Action/Theory of Planned Behavior; EST – ecological systems theory, ecological model
Figure 1: Map of the United States illustrating the geographic distribution of the states that are included in the survey results and states funded by the CDC’s Division of Nutrition, Physical Activity, & Obesity.

- Light Blue – state represented in the survey results
- Dark Blue – state funded by the CDC’s Division of Nutrition, Physical Activity & Obesity and represented in the survey results
- Yellow – state funded by the CDC’s Division of Nutrition, Physical Activity & Obesity and not represented in the survey results
The dashed vertical lines identify days when email invitations were sent to potential respondents. Email invitations were mailed at 9:00 am Eastern Standard Time (initial), 9:00 am Central Standard Time (first reminder), and 9:00 am Pacific Standard Time (second reminder).
Email Invitations Sent to Potential Survey Respondents

Initial email invitation to participate in the survey - (sent March 11, 2010 at 10:00 am Eastern Standard Time).

Dear [FirstName] [LastName],

My name is Dayna Maniccia, I am a doctoral candidate at the School of Public Health, State University of New York at Albany. I am interested in identifying if states have implemented or developed programs to modify children’s screen time (watching TV or videos/DVDs, playing video or computer games, and using the computer for purposes other than school work). The information collected will be compiled and distributed to key stakeholders, including your agency.

I am contacting you because, based information I found on your agency’s web-site, you may be able to provide me with information about programs in your state. Your participation is important and will ensure that information from your state is included in the compendium.

To facilitate information collection, I have developed a brief (5-10 minute) online survey that has two key aims:
1) collect information about programs to reduce children’s screen time that state departments or agencies have developed and/or conducted in the past three years; and, if no such work exists or is in progress
2) collect information about what would facilitate the development and implementation of such programs.

The survey can be reached by clicking on the link at the bottom of this email or by typing http://www.surveymonkey.com/s.aspx into your browser.

If you are not the best person from your agency to answer questions about programs to modify children’s screen time or if such programs are housed in a different agency, I would greatly appreciate it if you forwarded my email (and copied me) to the person whom I should contact.

If you would like more information about this project, you may contact me at this email address (dmaniccia@uamail.albany.edu) or by phone (518-368-0515). You may also contact Dr. Kirsten Davison, Associate Professor, University at Albany, School of Public Health, Department of Health Policy, Management, and Behavior (phone: 518-402-0293; email: kdavison@uamail.albany.edu).

Thank you in advance for your assistance.

Dayna M. Maniccia, MS DrPH candidate
Dear [FirstName] [LastName],

I am following up on an email I sent last week requesting information about programs in your state to reduce children’s screen time. As previously mentioned, the information collected will be included in a compendium of state programs and distributed to stakeholders including your agency. If you have already taken the survey I thank you for your time and apologize for sending this note.

If you have not completed the survey yet, I would appreciate it if you could take the time to do so, it will only take between 5 and 10 minutes. Your participation is important and will ensure that appropriate information from your state is included in the compendium of state programs. The survey can be reached by clicking on the link at the bottom of this email or by typing http://www.surveymonkey.com/s.aspx into your browser.

If you are not the appropriate person from your state to complete this survey it would be extremely helpful if you would forward this email (and copy me) to the person who has information about programs to modify children’s screen time.

If you would like more information about this project, you may contact me at this email address (dmaniccia@uamail.albany.edu) or by phone (518-368-0515). You may also contact Dr. Kirsten Davison, Associate Professor, University at Albany, School of Public Health, Department of Health Policy, Management, and Behavior (phone: 518-402-0293; email: kdavison@uamail.albany.edu).

Thank you for your assistance.

Dayna M. Maniccia, MS DrPH candidate
Second (and final) follow-up email - (sent March 29, 2010 at 9:00 am Pacific Standard Time).

Dear [FirstName] [LastName],

I am following up previous emails requesting information about state programs to reduce children’s screen time. If you have already completed the survey I thank you for your time and apologize for sending this note. If you have not completed the survey yet, it will only take between 5 and 10 minutes to do so. The survey can be reached by clicking on the link at the bottom of this email or by typing http://www.surveymonkey.com/s.aspx into your browser.

Your participation is important and will ensure that information from your state is included in the compendium of state programs that I will share with key stakeholders, including your agency. If you are not the appropriate contact person for your state, I would greatly appreciate it if you forward this email to the person whom I should contact and copy me on the email.

If you would like more information about this project, you may contact me at this email address (dmaniccia@uamail.albany.edu) or by phone (518-368-0515). You may also contact Dr. Kirsten Davison, Associate Professor, University at Albany, School of Public Health, Department of Health Policy, Management, and Behavior (phone: 518-402-0293; email: kdavison@uamail.albany.edu).

Thank you for your assistance.

Dayna M. Maniccia, MS DrPH candidate
Review of State Programs to Modify Children’s Screen Time

Review of State Programs to Reduce Children’s Screen Viewing Time

Welcome and thank you for taking the time to participate in this brief (5 - 10 minute) survey.

Your responses on this study will help answer the following two questions:
1) what programmatic activities are state departments undertaking to reduce children’s screen time?; and
2) for those states with no such programs, what barriers and facilitators are there to developing programs to address children’s screen time?

For the purposes of this survey, “screen time” refers to watching TV or videos/DVDs, playing video or computer games, and using the computer for purposes other than school work.

A program can focus solely on reducing children’s screen time or reducing screen time can be one component of a larger health promotion program.

If at any time you have questions regarding this survey, you should contact:

Dayna M. Maniccia, MS, DrPH candidate
Doctoral Candidate, Department of Health Policy, Management, and Behavior
University at Albany, School of Public Health
Phone: 518-442-2066
Email: dmaniccia@uamail.albany.edu
or
Kirsten K. Davison, PhD
Associate Professor
University at Albany, School of Public Health
Department of Health Policy, Management, and Behavior
Phone: 518-442-0293
Email: kbdavison@uamail.albany.edu

If you have any questions concerning your rights as a research participant that have not been answered by the investigator or if you wish to report any concerns about the study, you may contact the University at Albany Office of Regulatory Research Compliance at 518-442-9050 (toll free 800-365-9139) or orrc@uamail.albany.edu.
1. In the past three years, has your agency or department developed or implemented a program that addresses children’s screen time? (please select all that apply)

“Screen time” refers to watching TV or videos/DVDs, playing video or computer games, and using the computer for purposes other than school work.

- [ ] Yes, developed
- [ ] Yes, implemented
- [ ] Yes, currently implementing
- [ ] No
2. Please provide the name of the program.

3. How can I get more information about this program? (select all that apply)

☐ On the web (please provide URL in the space below)
☐ By calling or e-mailing us (please provide phone/e-mail address in the space below)
☐ Other (please provide details in the space below)

Please provide URL and/or contact information
4. Which of the following does the program address? (select all that apply)

- [ ] Television viewing
- [ ] Video and/or DVD viewing
- [ ] Video game and/or computer game use
- [ ] Computer use for non-educational purposes
- [ ] Other (please specify)
5. Does the program target a specific group of youth? (please select all that apply)

☐ No – the program targets all children
☐ Yes – children younger than age 5 years
☐ Yes – children ages 5 – 10 years
☐ Yes – children ages 11 – 15 years
☐ Yes – children ages 16 – 18 years
☐ Yes – overweight or obese children
☐ Yes – children who watch too much television
☐ Yes – non-white children
☐ Yes – other (please specify)
6. Is the program designed to ....... (check all that apply)

- [ ] increase children's confidence in their ability to decrease screen time
- [ ] change children's behavior by providing rewards or disincentives for screen time
- [ ] change children's beliefs about screen time or decrease factors that enable screen time or increase factors that decrease screen time
- [ ] address different issues depending on specific characteristics of the child related to their readiness to decrease screen time
- [ ] change children's intention to spend time in front of a screen by changing their beliefs and attitudes about screen time
- [ ] address multiple influences on children's screen viewing time (for example, peer and environmental influences)
- [ ] other (please specify)
Review of State Programs to Modify Children's Screen Time

Program Development

7. Who developed the program?

- The program was developed by my department/agency
- The program was developed by another department/agency
- The program was developed by researchers and was published in an academic journal
- Other (please specify below)

Program Developer
8. How was development of the program funded? (select all that apply)

☐ Grant from a federal government agency (e.g., CDC)
☐ Grant from a private agency
☐ State budget
☐ Other (please specify below)
☐ I'm not sure

Program Development Funding
9. Please provide the name of the department or agency that developed the program.
10. If you have implemented a program in the past three years, how was the program funded? (select all that apply)

- [ ] Grant from a federal government agency (e.g., CDC)
- [ ] Grant from a private agency
- [ ] State budget
- [ ] Other (please specify in the space below)
- [ ] I’m not sure
- [ ] We have not implemented a program in the past three years

Program Implementation Funding

11. Has your agency evaluated the program?

“Evaluated” means that the performance of the program was systematically assessed. Often this is achieved by comparing the two groups (one group that received the program to one that did not) or by comparing the same individuals before and after they have received the program to see if behavior differs as a result of the program.

- [ ] Yes
- [ ] No
- [ ] I’m not sure
12. Where can I find information about the evaluation of your program?
13. In the past three years, has your department or agency provided funding to another entity to so that they can develop or evaluate a program to modify children’s screen time?

- [ ] Yes
- [ ] No
- [ ] I'm not sure
14. Who was eligible to receive funding? (select all that apply)

☐ Schools
☐ Child care centers
☐ Other state agencies
☐ Not-for-profit organizations
☐ Other (please specify in the box below)
☐ I'm not sure

Who else was eligible for funding?

15. Is information about the program(s) they developed available?

☐ Yes
☐ No
☐ I'm not sure
16. Where can I find this information?
Barriers and Facilitators

17. The following are some reasons why an agency may choose not to develop or implement a program at this time. Please check the reasons why your agency has not developed or implemented a program to address children’s screen time. (please select all that apply)

☐ There is not yet a strong enough case to support such a program
☐ There is not enough information available to develop such a program
☐ We do not have enough money
☐ We do not have enough time
☐ We do not have the expertise
☐ We don’t know who to contact for assistance
☐ Too big of a task / we serve too large of a population
☐ It is not our job to develop such a program
☐ The population we serve is not interested in such a program
☐ The agency is not interested in such a program
☐ Other (please specify)
18. Please select your state.

State: 

19. What is your job title?


20. I will be compiling all of the information that I’ve collected into one large document for distribution to key stakeholders.

The information will be presented in a form similar to the following: For more information about the program please contact Dayna Maniccia at 518-368-0515 or UAlbany School of Public Health, 1 University Place, Rensselaer NY 12144.

Would you like to have contact information included with the description of your program (if applicable)?

☐ Yes I would like you to include my contact information
☐ Yes, but please included contact information for someone other than myself
☐ No thank you, I do not want my contact information included.
21. Please provide the contact information that you would like to include with the description of the program. Only the information provided below will be included in the compendium.

<table>
<thead>
<tr>
<th>NAME</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td></td>
</tr>
<tr>
<td>TELEPHONE</td>
<td></td>
</tr>
<tr>
<td>E-MAIL</td>
<td></td>
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<tr>
<td>POSTAL MAIL</td>
<td></td>
</tr>
</tbody>
</table>
22. We plan to conduct short interviews (15-30min) with state personnel responsible for delivery and/or implementation of children’s programs to help us learn more about the strategies and barriers in developing programs to modify children’s screen viewing behavior.

The types of things we are interested in include:
• what would facilitate program development in the future?
• what are some challenges you face when developing or implementing a program like this, and how can you deal with them?
• what would you do differently if you had the opportunity to do it again / what would you not change
• plans you may have for sustainability of the program
• recommendation you would give to others who are interested in developing or implementing programs to modify children’s screen viewing behavior

Would you be willing to share your opinions and ideas in a short phone interview with us?

☐ Yes
☐ Yes, but you should really talk to one of my colleagues about this.
☐ No thank you
23. Thank you for your willingness to speak with us. Please provide your preferred contact information (email or phone number) so we can contact you to schedule a phone interview. Feel free to also suggest a time that is most convenient for you.

YOUR NAME
YOUR CONTACT INFORMATION
SUGGESTED TIME
24. Thank you for suggesting I speak with your colleague. Please provide your colleague’s contact information.

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Role / Title</td>
</tr>
<tr>
<td>Telephone number</td>
</tr>
<tr>
<td>E-Mail</td>
</tr>
</tbody>
</table>
Review of State Programs to Modify Children’s Screen Time

Thank you for completing this survey, your time and assistance are greatly appreciated.

If you have questions regarding this survey or your participation in it, contact

Dayna M. Maniccia, MS, DrPH candidate
University at Albany, School of Public Health
Department of Health Policy, Management, and Behavior
Phone: 518-368-0515
Email: dmaniccia@uamail.albany.edu

or

Kirsten K. Davison, PhD
Associate Professor
University at Albany, School of Public Health
Department of Health Policy, Management, and Behavior
Phone: 518-442-0293
Email: kdavison@uamail.albany.edu

If you have any questions concerning your rights as a research participant that have not been answered by the investigator or if you wish to report any concerns about the study, you may contact the University at Albany Office of Regulatory Research Compliance at 518-442-9050 (toll free 800-365-9139) or orrc@uamail.albany.edu.
Frequency Distribution of Answers to Survey Questions

Note: These data included responses for multiple individuals from the same state (10 states had two people complete the survey). The following figures provide frequency distribution of respondent answers and can not be used to draw conclusions about the states.

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In the past three years, has your agency or department developed or</td>
<td></td>
<td></td>
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<tr>
<td>implemented a program that addresses children’s screen time? (please</td>
<td></td>
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</tr>
<tr>
<td>select all that apply) “Screen time” refers to watching TV or videos/DVDs,</td>
<td></td>
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<tr>
<td>playing video or computer games, and using the computer for purposes</td>
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<tr>
<td>other than school work.</td>
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<tr>
<td>Yes, developed</td>
<td>23.4%</td>
<td>11</td>
</tr>
<tr>
<td>Yes, implemented</td>
<td>31.9%</td>
<td>15</td>
</tr>
<tr>
<td>Yes, currently implementing</td>
<td>23.4%</td>
<td>11</td>
</tr>
<tr>
<td>No</td>
<td>48.9%</td>
<td>23</td>
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<tr>
<td>answered question</td>
<td>47</td>
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<tr>
<td>skipped question</td>
<td>13</td>
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</table>
3. How can I get more information about this program? (select all that apply)

<table>
<thead>
<tr>
<th>Response</th>
<th>Response Count</th>
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<tbody>
<tr>
<td>On the web (please provide URL in the space below)</td>
<td>38.1% 3</td>
</tr>
<tr>
<td>By calling or e-mailing us (please provide phone/e-mail address in the space below)</td>
<td>66.7% 14</td>
</tr>
<tr>
<td>Other (please provide details in the space below)</td>
<td>14.3% 3</td>
</tr>
<tr>
<td>Please provide URL and/or contact information</td>
<td>21</td>
</tr>
</tbody>
</table>

answered question 21

skipped question 39

4. Which of the following does the program address? (select all that apply)

<table>
<thead>
<tr>
<th>Response</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television viewing</td>
<td>95.7% 22</td>
</tr>
<tr>
<td>Video and/or DVD viewing</td>
<td>66.6% 16</td>
</tr>
<tr>
<td>Video game and/or computer game use</td>
<td>66.6% 16</td>
</tr>
<tr>
<td>Computer use for non-educational purposes</td>
<td>60.9% 14</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>26.1% 6</td>
</tr>
</tbody>
</table>

answered question 23

skipped question 37

Open-ended responses to Question 4

1. Screen time; all visual recordings
2. playing games on cell phones
3. All screen time
4. cellphones
5. Screen Time
6. The recommendations are generalized as screen use. Another program our schools use is TV off week
Open-ended responses to Question 5

1. Birth to 5 years old...but primarily children in child care settings (so they could be older)

2. WAABAM is for children under 5.
   Screen TIME matters is a continuing Ed lesson for school-aged provider audience.
   Powerful Choices is for 3rd-5th grade students

3. This is an assessment tool for use in the child care setting of young children and information for child care staff as gatekeepers of that setting.

4. Children ages 2-18

5. Children infant – school age in child care centers
Open-ended responses to Question 6

1. Change policy in child care facilities as to amounts of screen time allowed daily
2. Educate child care providers about the effects of screen time on early childhood development and give them some ideas to improve child care settings and outreach to parents
3. Change childcare center behaviors and practices around screen time
4. Encourage families to reduce or eliminate TV watching during TV Turn Off Week
Open-ended responses to Question 7

1. In conjunction with NJ Assoc of childcare resource. And referral agencies (NJACCRA)
2. The program we have used is a toolkit that we have purchased.
4. The program is really a larger initiative to address several target areas, including television viewing. It is not a program. A state plan to address obesity is being developed and their will be objectives and strategies specific to addressing television view from a policy environmental perspective.
5. The student video competition is a joint effort between the Hawaii State Dept. of Health and Olelo Community Television (public access station).
6. This module was initially developed through a one-year state-funded contractor of the NYSDOH Obesity Prevention Program. The assistance of other contributing consultants also contributed to its development. The Obesity Prevention Program hopes to secure a modest amount of funding to implement and test the module in the 2010-2011 grant year of CDC funding. This work would be conducted by the current state-funded contractor implementing NAP SACC.
7. My dept/agency in collaboration with the Dept. of Education in VT.
8. The project was done in collaboration with partners from the medical community and department of health
9. Adapted from MA 5.2.1.0 program. In addition, different communities in the state apply the principles differently. For example, the Mayor of Las Cruces conducts a Fitness and Nutrition 5.2.1.0 Challenge to all 3rd graders and if they meet his challenge they receive a gold coin with the Mayor’s Seal on it.
10. Center for Screen Time Awareness- Robert Kesten
11. Center for Screen Time Awareness
Open-ended responses to Question 8

1. Stimulus funds
2. Tobacco Settlement Special Funds
3. State funding - Childhood Obesity Prevention Program allocation
   Federal funding - CDC Division of Nutrition, Physical Activity and Obesity to state-based programs
4. partnership with action for healthy kids and others
5. Other contributions from: medical academic institution, private health system, and from training proceeds
6. Multiple federal and state funding sources
7. State health department staff that were funded under the PHHS Block Grant promoted TV Turn Off Week.
Open-ended responses to Question 10

1. See above
2. Tobacco Settlement Special Fund
3. partnership with action for healthy kids and others
4. We have initiatives we implement that again forward the message but are not considered actual programs
5. Multiple federal and state funding sources
6. I don't consider this promotional program an "implemented" program.

11. Has your agency evaluated the program? "Evaluated" means that the performance of the program was systematically assessed. Often this is achieved by comparing the two groups (one group that received the program to one that did not) or by comparing the same individuals before and after they have received the program to see if behavior differs as a result of the program.

<table>
<thead>
<tr>
<th>Response</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>34.6%</td>
<td>8</td>
</tr>
<tr>
<td>No</td>
<td>65.2%</td>
<td>15</td>
</tr>
<tr>
<td>I'm not sure</td>
<td>0.0%</td>
<td>0</td>
</tr>
</tbody>
</table>

answered question 23
skipped question 37
Open-ended responses to Question 14

1. United Way, Child Care Resource and Referral have partnered with us in this entire effort. These organizations work closely with child care facilities statewide.

2. I am not from the state agency. I am from the university based non-profit that received funding to develop screen time reduction materials & programs

3. We recently released an RFP for the purpose of amending state child care licensing rules to include restrictions about the amount of screen time allowed in child care programs.
15. Is information about the program(s) they developed available?

<table>
<thead>
<tr>
<th>Response</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>80.0%</td>
<td>4</td>
</tr>
<tr>
<td>No</td>
<td>20.0%</td>
<td>1</td>
</tr>
<tr>
<td>I’m not sure</td>
<td>0.0%</td>
<td>0</td>
</tr>
</tbody>
</table>

16. The following are some reasons why an agency may choose not to develop or implement a program at this time. Please check the reasons why your agency has not developed or implemented a program to address children’s screen time. (please select all that apply)

<table>
<thead>
<tr>
<th>Reason</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is not yet a strong enough case to support such a program</td>
<td>12.5%</td>
<td>5</td>
</tr>
<tr>
<td>There is not enough information available to develop such a program</td>
<td>10.0%</td>
<td>4</td>
</tr>
<tr>
<td>We do not have enough money</td>
<td>55.0%</td>
<td>22</td>
</tr>
<tr>
<td>We do not have enough time</td>
<td>47.5%</td>
<td>19</td>
</tr>
<tr>
<td>We do not have the expertise</td>
<td>7.5%</td>
<td>3</td>
</tr>
<tr>
<td>We don’t know who to contact for assistance</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Too big of a task / we serve too large of a population</td>
<td>10.0%</td>
<td>4</td>
</tr>
<tr>
<td>It is not our job to develop such a program</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>The population we serve is not interested in such a program</td>
<td>2.5%</td>
<td>1</td>
</tr>
<tr>
<td>The agency is not interested in such a program</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>40.0%</td>
<td>16</td>
</tr>
</tbody>
</table>

| answered question | 40 |
| skipped question  | 20 |
Open-ended responses to Question 17

1. We were focused on K-12 school settings and now moving to childcare settings. Also there are not clear cut programs developed that health departments could use readily.

2. Another organization in the state is currently addressing it.

3. We did!

4. There are not enough models out there for effective evidence-based programs at the state level.

5. No dedicated FTE and funding

6. Our program is primarily focused on policy and environmental change within the worksite, school and community settings. Screen time is more of a family policy. TV time is incorporated as a strategy in our toolkits, put not a stand alone program.

7. We are hiring a physical activity coordinator to work on this issue.

8. Developing a program to directly effect individual behavior is not the scope of our work. However, our initiative focuses on policy and environmental change to support a change in television viewing behavior.

9. We DID develop a program

10. Gov't imposed spending restrictions

11. Here at the MS Department of Education we work with school districts to help provide information to their students on quality physical education that includes quality play time at home

12. Additional funding opportunities could greatly enhance the existing program

13. We are currently writing this piece into our Physical Activity and Nutrition Plan - are working on developing programs in this area, but have not at the current time been actively working on programs in this area.

14. The timing is not right. Indiana is currently developing a state plan for obesity prevention. One of the factors we will be addressing in the plan is television viewing. Once we have the state plan finalized, we will begin developing/implementing programs. The state plan will be complete by July 2010.

15. Our focus now is policy vs. programming.

16. We aren't clear on how we would carry out such a program beyond a media campaign. We don't work directly with individuals and we haven't identified a likely group to implement such a program.
20. I will be compiling all of the information that I’ve collected into one large document for distribution to key stakeholders. The information will be presented in a form similar to the following: For more information about the program please contact Dayna Maniccia at 518-368-0515 or UAlbany School of Public Health, 1 University Place, Rensselaer NY 12144. Would you like to have contact information included with the description of your program (if applicable)?

<table>
<thead>
<tr>
<th>Response</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes I would like you to include my contact information</td>
<td>53.7%</td>
<td>22</td>
</tr>
<tr>
<td>Yes, but please included contact information for someone other than myself</td>
<td>7.3%</td>
<td>3</td>
</tr>
<tr>
<td>No thank you, I do not want my contact information included.</td>
<td>39.0%</td>
<td>16</td>
</tr>
</tbody>
</table>

answered question 41

skipped question 19

22. We plan to conduct short interviews (15-30min) with state personnel responsible for delivery and/or implementation of children’s programs to help us learn more about the strategies and barriers in developing programs to modify children’s screen viewing behavior. The types of things we are interested in include: • what would facilitate program development in the future? • what are some challenges you face when developing or implementing a program like this, and how can you deal with them? • what would you do differently if you had the opportunity to do it again / what would you not change • plans you may have for sustainability of the program • recommendation you would give to others who are interested in developing or implementing programs to modify children’s screen viewing behavior Would you be willing to share your opinions and ideas in a short phone interview with us?

<table>
<thead>
<tr>
<th>Response</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>53.7%</td>
<td>22</td>
</tr>
<tr>
<td>Yes, but you should really talk to one of my colleagues about this.</td>
<td>7.3%</td>
<td>3</td>
</tr>
<tr>
<td>No thank you</td>
<td>39.0%</td>
<td>19</td>
</tr>
</tbody>
</table>

answered question 41

skipped question 19
CHAPTER 4
CONCLUSIONS AND RECOMMENDATIONS

Overview

Currently, few would argue that excessive screen time and childhood obesity are matters of public health concern. Rates of childhood obesity have been increasing for more than 20 years (Wang & Beydoun, 2007) as has children’s use of electronic media (Rideout & Hamel, 2006; Rideout, Foehr, & Roberts, 2010). In 1985, Dietz and Gortmaker first linked TV viewing and obesity in adolescents (Dietz & Gortmaker, 1985). Since then, many have assessed the relationship between television and obesity (Marshall, Biddle, Gorely, Cameron, & Murdey, 2004; Mendoza, Zimmerman, & Christakis, 2007; Must & Tybor, 2005; Proctor et al., 2003). Although the relationship is small (Marshall, et al., 2004), television viewing is a modifiable behavior that is associated with obesity and, the association between television viewing and obesity is greater than that between nutritional intake or physical activity and obesity (Hancox & Poulton, 2006).

Limiting children’s screen time is a recommended strategy for decreasing child overweight (American Academy of Pediatrics - Committee on Nutrition, 2003; American Academy of Pediatrics Committee on Public Education, 2001; Institute of Medicine (U.S.). Committee on Prevention of Obesity in Children and Youth. et al., 2005). A barrier to using evidence in program development and implementation is a lack of time to gather information, analyze data, and review the literature, another is a lack of comprehensive, up-to-date information on effectiveness of programs and policies.
(Brownson, Baker, Leet, & Gillespie, 2003), this work is a step toward removing these barriers. Although there have been several comprehensive reviews of obesity prevention and treatment programs (Boon & Clydesdale, 2005; Connelly, Duaso, & Butler, 2007; DeMattia & Lee Denney, 2008; Oude Luttikhuis et al., 2009; Stice, Shaw, & Marti, 2006; Summerbell et al., 2005; Summerbell et al., 2003; Whitlock, Williams, Gold, Smith, & Shipman, 2005; Wofford, 2008) and physical activity interventions (Foster, Hillsdon, & Thorogood, 2008) until now, no review of screen time interventions was available.

Studies 1 and 2 in this dissertation were designed to address the need for information about what programs exist that address children’s screen time and which are effective. Collectively this dissertation identified programs to modify screen time that have been developed and tested a) in a research setting and b) on a large scale by state departments or agencies. By providing an overview of available programs from both settings, this work serves as a resource for program personnel and researchers. It provides a description of effective interventions and common elements across interventions. The information can be used to direct further research and intervention development.

The aim of Study 1 was to identify evaluated programs that target changes in children’s screen time as an outcome. To this end, a systematic review and meta-analysis were conducted. By using organized, transparent, and replicable procedures, systematic reviews aim to comprehensively locate and synthesize research (Littell, Corcoran, & Pillai, 2008). Meta-analyses build on systematic reviews by converting study results to a common metric and calculating a summary estimate of effect across studies (Briss, Dolan Mullen, & Hopkins, 2005). Since it was anticipated that the programs identified in Study 1 would be small in scale, Study 2 was developed to identify large scale interventions.
Study 2 utilized a web-based survey design to collect information about programs to modify children’s screen time that were developed and/or implemented by state departments or agencies.

Hypothesis

It was hypothesized that two main types of interventions would be identified and reviewed: targeted or selective interventions and universal interventions. Universal interventions (e.g., TV Turn Off Week) focus on a large population while selective and targeted (indicated) interventions are directed at a specific audience (e.g., children in daycare settings) and persons who meet a specific criteria (e.g., children who exceed television viewing recommendations) (Institute of Medicine Food and Nutrition Board: Committee to Develop Criteria for Evaluating the Outcomes of Approaches to Prevent and Treat Obesity, 1995; "Obesity: preventing and managing the global epidemic. Report of a WHO consultation," 2000). It was expected that the systematic literature search would identify primarily targeted and selective interventions with statistically significant positive results given the tendency for such results to be published more frequently (Schulze, 2004). It was also anticipated that the programs identified through the survey of state personnel would be universal interventions. Overall, the hypothesis was supported. The majority of the programs identified in the systematic review were small scale programs that were directed at a specific audience (e.g., school children). Generally, these programs exhibited positive results - in some cases, non-significant screen time specific results existed but other outcomes were positively impacted by the program. The
majority of the programs identified through the state survey were large scale and un-evaluated (e.g., TV turnoff).

Summary of Studies

Summary of Study 1

Study 1 aimed to quantitatively assess the impact of interventions on children’s screen time using a meta-analytic design. Thirty-three references were identified as eligible for inclusion in the meta-analysis. Adequate data were available for 29 interventions, of these 27, provided post-intervention data and five reported data collected during the intervention period. Overall, the interventions had a small effect (SDM = -0.148 (95% CI -0.217, -0.072) on screen time post-intervention using accepted criteria for ES magnitude (0.2 = small, 0.5 = medium, and 0.8 = large) (Cohen, 1988; Littell, et al., 2008; Wolf, 1986)). During the intervention period the interventions exhibited a large effect (SDM = -1.904 (95% CI -3.041, -0.767)). Generally, the interventions were delivered in the home or school and approximately half incorporated use of a TV control device. Of those that were theory based, the most frequently used theory was Social Cognitive Theory. Most interventions employed various strategies including provision of information, goal setting, behavior monitoring, and positive reinforcement.

Summary of Study 2

Study 2 described large scale interventions to modify children’s screen time that have been developed and/or delivered by state departments or agencies. Forty-seven individuals from 36 states completed a web-based survey. Roughly half of the
respondents indicated that their agency had developed and/or implemented a program to modify children’s screen time. The majority of the programs were informational or encouraged participants to participate in the desired behavior for a short period (e.g., TV turnoff week). Several of the programs were theory-based, most frequently base on the Theory of Reasoned Action/Theory of Planned behavior and the Ecological Model. Most programs were developed by the respondents’ agency rather than drawing on programs published in the peer review literature. The most frequently cited source of funding was the federal government. The most frequently stated barriers to program development and implementation were lack of money and time. As was anticipated, the majority of state level programs had not been evaluated.

Recommendations

The following recommendations to modify children’s screen time and for future work are provided based on the results of the systematic review, information collected in the state program survey, and information from the literature.

*Include Both the Family and the Child in the Intervention.*

Since much of children’s use of screen media occurs in the home, programs to change behavior should involve family members. Some ways to involve parents include having the parent provide support and encouragement to the child or have the parent model the desired behavior. Many of the interventions included in the meta-analysis involved the family in the behavior change efforts by providing information to the parents or encouraging parents to support and reward the child. Several of the states represented in the state program review promoted a television turn-off period thus
involving the whole family. Information collected from parents and their children led to several strategies to reduce screen time that involve the family, including teaching parents to pay attention to the amount of time children spend with screen media, not putting a television in children’s room or in eating areas, not connecting television viewing with eating at all, eliminating background television, limiting television on school days, and identifying and participating in in-home pleasurable non-screen activities (Jordan, Hersey, McDivitt, & Heitzler, 2006). Children’s media use is related to parental media use (Rideout & Hamel, 2006) so changing parental media use should also be targeted in future work. Research should focus on assessing the reasons behind placing televisions in children’s rooms so interventions that address these reasons can be developed.

Make the Intervention Enjoyable for Children

Children have cited “fun” as a desirable characteristic of a prevention program (Wilson, 2007). A strategy employed by several interventions included in the meta-analysis (which could help develop “fun” interventions for children) is to have the child identify alternative activities. If interventions can incorporate activities children enjoy, the effectiveness of the interventions may increase. Additionally, several of the interventions included in the meta-analysis included a goal setting component – specifically having the child set his/her screen time goals. Teaching children critical viewing and time budgeting skills will assist the child with the behavior change by providing some of the necessary skills to change and will help maintain the behavior in the future by providing the child with a sense of control over his/her behavior.
Provide Information to Facilitate Behavior Change

Parents have identified several benefits of decreasing children’s television including more quality time with children and improved communication, performance, and behavior (Jordan, et al., 2006). In the same study, parents noted several barriers to modifying children’s television viewing including the perception that television is a “low-cost, effective baby-sitter”, it provides children companionship, it is a pleasurable activity for children, and it is an activity for parents and children to share (Jordan, et al., 2006). Future work should include illustrating the benefits of reduced screen time to children and parents and providing ways to address some of the perceived barriers.

Additionally, programs should make sure to provide children with information about the desired behavior. A survey of adolescents to determine what they would like in obesity prevention programs revealed that the majority did not believe reductions in screen time would impact obesity (Wilson, 2007) – children will be less motivated to decrease screen time if they do not see the benefit of the behavior. A common characteristic of programs included in this review was the distribution of information about the benefits of reduced screen time and alternative activities.

Develop and Evaluate Evidence-based Programs

As hypothesized, the majority of state programs have not been evaluated. In the future, efforts should be made to evaluate programs to promote continued use of effective programs. It is also recommended that state programs attempt to utilize evidence-based interventions whenever possible – only one of the states included in the state program review used a program that was evaluated and published in the peer-review literature. To facilitate implementation of research based programs, program developers should
develop programs that are easily adapted for use on a large scale, require minimal
specialized training for implementation, and are cost-effective. Evaluation plans should
be developed early in the program development stage and should assess program
outcomes and process (Brownson, et al., 2003).

Several theories/models were used in the screen time interventions reviewed. The
Ecological Model and the Theory of Reasoned Action/ Theory of Planned Behavior were
most frequently used in state based programs; the Ecological model and Social Cognitive
Theory were most frequently used in the development of the programs included in the
meta-analysis. One component of Social Cognitive Theory commonly employed by the
programs included in the meta-analysis was the provision of rewards, a strategy that
children have expressed can facilitate participation in a healthy behaviors (Wilson, 2007).
Future work should attempt to incorporate a reward mechanism into large scale
interventions. One way to do this would be to increase parent’s knowledge about the
importance of rewarding children for non-screen time behaviors – thus increasing the
likelihood that they will reward the child for behaviors other than those which involve
screen time.

*Develop Targeted Programs*

Several factors including minority status, parental income, and parental education
are associated with television viewing (Gorely, Marshall, & Biddle, 2004). Programs to
change children’s TV viewing should be targeted at high risk groups. Few of the
programs identified specifically targeted these high use groups. Future work should also
focus on identifying groups at risk for excessive screen time and on developing programs
designed for these groups. State-based programs could be modified slightly to focus on a
target population. For example, program materials could be developed in several languages and culturally competent messages incorporated thus targeting non-white populations. In addition, more programs should focus on young children in child care settings since many are exposed to more television than recommended while in home and center based child care programs (Christakis & Garrison, 2009).

Facilitate Program Sustainability by Incorporating Program Materials into Existing Structures

Several interventions targeted school-aged children by incorporating intervention material into existing school curriculums. This strategy of incorporating intervention messages into existing programs should be used when possible to increase reach and decrease time and financial barriers associated with stand alone programs. By capitalizing on existing structures and resources, programs can increase the chance of sustainability (Hoag & Stevens, 2008)

Future Work Should Focus on Screen Time Related Behaviors

Although having a television in the bedroom has been associated with an increase in BMI (American Academy of Pediatrics - Committee on Nutrition, 2003; Dennison, Erb, & Jenkins, 2002) few interventions specifically targeted the removal of televisions from children’s’ bedrooms or not placing TV sets in the child’s bedroom. Future programs should attempt to increase awareness of the negative impacts of televisions in the bedroom and promote television free bedrooms. The strategy of removing televisions from children’s bedrooms has recently been promoted as a way to help achieve the recommended amount of screen time (Barlow & Expert Committee, 2007). Likewise,
children frequently eat in front of a television (Christakis, Ebel, Rivara, & Zimmerman, 2004; Rideout, et al., 2010) but the behavior was targeted in very few programs.

The American Academy of Pediatrics recommends limiting children’s total screen time (American Academy of Pediatrics Committee on Public Education, 2001; American Academy of Pediatrics Council on Communications and Media, 2009). The appearance of new media has not displaced television viewing – TV use has remained relatively stable (Marshall, Gorely, & Biddle, 2006) and children still spend the majority of their time watching television (Roberts & Foehr, 2008) yet total media use has increased (Rideout, et al., 2010). Future works should be sure to address screen time other than television. Studies should focus on assessing the amount of time children spend with new media (e.g., cell phones, portable music devices, and hand held video games) since use of these new forms of media are becoming more common. Children are able to take screen media with them in the form of cell-phones, iPods and other MP3 devises (among older children (ages 8 to 18 years) 66% own their own cell phone, and 75% have an iPod or other MP3 player. Additionally, the average child spends approximately 30 minutes per day talking on the cell phone, 49 minutes listening to, playing, or watching other media on their phones, and about 1.5 hours texting (Rideout, et al., 2010). Programs should be developed to address the simultaneous use of media (e.g., listening to the radio while playing video games) which adds up to more than 10 hours of media content each day (Rideout, et al., 2010). Researchers should strive to assess the impact that other media has on childhood obesity and other negative health effects since current data largely focuses on television viewing, video/DVD, video/computer game, and computer use for non-academic purposes.
Several of the recommendations provided here are similar to what has been recommended for nutrition interventions, such as programs should be theoretically based, involve the family as a source of reinforcement, and include the child (Sahay, Ashbury, Roberts, & Rootman, 2006). Additionally, Sahay and colleagues noted effective interventions deliver clear messages and provide adequate training and ongoing support (Sahay, et al., 2006). Although not specifically addressed here, these characteristics should also be incorporated into future screen time programs.

Summary

This dissertation contributes to the field of child and public health by providing an overview of existing programs to modify children’s screen time and some suggestions for future work. Although a systematic attempt was made to identify interventions that target screen time, it is possible that some interventions may have been missed in the search process. Additionally, it was not the goal of this work to identify programs developed or implemented by private organizations or local health departments. Therefore, some screen time interventions may be missing from this review. Continual review of the literature and attempts to develop a compendium of interventions that include programs developed or implemented by private organization or local health departments should occur.

No one will argue against the fact that media is ubiquitous – as more and different opportunities for media use become available, researchers should assess the impact on children’s health and wellbeing and strive to develop programs to minimize negative effects. Work should focus on attempting to identify and maximize the positive impacts
of media and develop methods to use media for delivery of health promotion programs. The studies in this dissertation serve as a starting point, a resource for public health practitioners and child health advocates who are looking for ways to decrease children’s screen time. Additionally, they provide researchers with information about the efficacy of existing programs and common program characteristics that can be used to direct future research and program development.
References


