

2013

Adolescents, Obesity, and Motivational Interviewing

Betty J. Cheney

Wright State University - Main Campus

Follow this and additional works at: <http://corescholar.libraries.wright.edu/mph>



Part of the [Public Health Commons](#)

Repository Citation

Cheney, B. J. (2013). *Adolescents, Obesity, and Motivational Interviewing*. Wright State University, Dayton, Ohio.

This Master's Culminating Experience is brought to you for free and open access by the Master of Public Health Program at CORE Scholar. It has been accepted for inclusion in Master of Public Health Program Student Publications by an authorized administrator of CORE Scholar. For more information, please contact corescholar@www.libraries.wright.edu.

Adolescents, Obesity, and Motivational Interviewing

Betty J. Cheney

Wright State University

Table of Contents

Abstract3

Introduction.....4

Statement of Purpose5

Literature Review.....6

Research Questions12

Methods.....13

Results.....20

Discussion.....30

Conclusion36

References.....38

Appendices.....44

 Appendix A. Literature Search Results44

 Appendix B. List of Tier 1 Core Public Health Competencies Met48

Abstract

The United States has seen higher rates of obesity (18.4%) in adolescents in recent years. The impact of obesity can be felt at all levels of public health because of the co-morbidities that correlate to obesity, especially in adolescents. Health outcomes for these future adults are dampened by health behavior decisions made today. Motivational interviewing has demonstrated promising evidence but mixed results when addressing health-related behaviors in adolescents. It is unclear what intervention characteristics are most successful, so more research is required to determine the intervention most appropriate for adolescents to improve health-related behaviors and ultimately improve health outcomes associated with obesity.

Keywords: weight management, health problems, behavior change, interventions

Adolescents, Obesity, and Motivational Interviewing

Childhood obesity is a major health problem in the United States. Overall, 16.9% of children are obese. Adolescents, as a subset of this population, had an obesity rate of 18.4% in 2009-2010. Obesity at any age leads to chronic diseases and conditions that impact the life of the child into adulthood. Potential chronic health risks include hypertension, hyperlipidemia, diabetes mellitus, and arthritis. Obesity in childhood is likely to persist into adulthood with worsening health outcomes over time. Concern has grown in the public health community because chronic conditions developing early in life may increase overall mortality and eventually result in a generation with a life expectancy less than their parents' generation.

Weight management is a challenge for all ages. At this time, there is no panacea for healthy weight management for each individual. General guidelines support reducing caloric intake and increasing energy expenditure to maintain a healthy weight, but the information alone is not sufficient to create changes in health behaviors. Changing health behavior is one of the greatest challenges in public health. Information and awareness is the first step, but not the final step toward behavior change. The individual must be motivated and prepared to make a health behavior change. Without motivation and preparation for change, health behavior changes cannot be maintained over time. Good weight management requires regular physical activity and reasonable nutrition. A variety of interventions to assist in individual weight management exist, but they may not be appropriate or effective for everyone, as they have mixed results. Weight management strategies that work for adults may not be as effective or appropriate for adolescents.

As part of their developmental process, adolescents struggle to assert their independence from their parents to develop behaviors that fit with their own lifestyle choices. More often than

not, adolescents (and adults) are aware of behaviors that would produce better health outcomes but they have difficulty achieving and maintaining the appropriate behaviors. This difficulty is seen with weight management strategies, as well as, risk-taking behaviors, substance use, and compliance with medical treatment for chronic diseases.

Motivational interviewing is a communication style designed to support individuals in making healthier decisions. Motivational interviewing may be a good strategy to support adolescents in making decisions that will help them appropriately manage their weight. Motivational interviewing, at its core spirit, is not a tool or technique but an interpersonal style that facilitates the progression through the stages of change, as described by the transtheoretical model. Motivational interviewing focuses on the patient's motivation and thoughts around a particular health behavior. The interviewer guides the patient using questions and reflective listening to explore choices and behaviors, as well as the willingness to move from the current stage of change and establish goals that may be appropriate for moving to the next stage. Motivational interviewing may be well-suited to assist adolescents as they develop their personal values, autonomy, and identity, which impact their health behavior decisions. Using motivational interviewing to guide appropriate health behavior decisions, preventing and treating obesity may be possible in adolescents.

Statement of Purpose

The intent of this best-practices review is to explore weight management techniques and the role of motivational interviewing to assist adolescents at-risk for obesity in the United States to make better health behavior decisions. At this stage weight management techniques may address some combination of nutrition, physical activity, and other changes in health behavior.

Literature Review

Overview

Childhood obesity is a major public health concern, with an estimated 16.9% of US children and adolescents considered obese in 2009-2010 (Ogden, Carroll, Kit, & Flegal, 2012). The estimated prevalence of obesity in adolescents, 12 to 19 years old, was higher at 18.4%. On the BMI-for-age growth charts, a BMI equal to or greater than the 85th percentile and less than 95th percentile is defined as overweight and a BMI equal to or greater than the 95th percentile is defined as obese. Despite many efforts to reduce childhood obesity, the rates have remained constant around 17% over the last decade (Ogden et al., 2012). Obesity during childhood and adolescence increases the risk for obesity as an adult (Singh, Mulder, Twisk, van Mechelen, & Chinapaw, 2008). Along with persistence of obesity into adulthood, childhood and adolescent obesity has an adverse impact on blood pressure and serum levels of lipids and insulin (Freedman, Mei, Srinivasan, Berenson, & Dietz, 2007). Inappropriate levels of these factors may increase the risk of multiple chronic diseases in childhood and adulthood, including cardiovascular disease, liver disease, and type 2 diabetes (Crocker & Yanovski, 2011; Freedman et al., 2007; Singh et al., 2008). Potential psychosocial consequences for adolescents include externalizing or internalizing behavior problems (such as aggressive behavior or social withdrawal), attention deficit hyperactivity disorder (ADHD), and sleep apnea (Pulgaron, 2013). Obesity in childhood is associated with lower self-esteem, which can lead to negative emotions such as loneliness, sadness, and nervousness (Strauss, 2000). Furthermore, lower self-esteem in obese children has been associated with higher levels of risk-taking behaviors (Strauss, 2000).

Obesity has a complex etiology unique to each individual with multiple and overlapping factors involved (Skelton, Irby, Grzywacz, & Miller, 2011). The rapid increase in obesity in

children over the last few decades cannot be explained by one factor alone (Crocker & Yanovski, 2011). Reduced physical activity and increased sedentary activity contribute to the development of obesity in children and adolescents (Skelton et al., 2011). The built environment, changes in neighborhood structure and layout, may contribute to the decline in physical activity (Skelton et al., 2011). Genetics and endocrine disorders may cause obesity, although behavioral and environmental factors or gene by environmental interaction are contributing factors of obesity in most cases (Skelton et al., 2011).

Weight Management and Barriers to Successful Weight Management with Adolescents

Weight management interventions for adolescents are abundant, but certain barriers to achieving weight management goals have been identified. Concerns about neighborhood safety and access to outdoor areas for physical activity prohibit some adolescents from exercising regularly (Stankov, Olds, & Cargo, 2012; Voorhees, Yan, Clifton, & Wang, 2011). Most adolescents are dependent on their parents for transportation, therefore access to after-school activities and sources of extracurricular physical activity are limited (Stankov et al., 2012). Some adolescents express a lack of time or resources as the primary reason they are unable to be physically active (Stankov et al., 2012). Adolescents must balance school and home requirements with physical activity, as a result physical activity may be a low priority for the adolescents and their parents (Stankov et al., 2012). For overweight and obese adolescents, participating in physical activity is prohibited by concerns about bullying and negative peer interactions during school physical education classes (Stankov et al., 2012). Feelings of being “too out of shape” or experiencing physical discomfort during or after physical activity may prevent adolescents from engaging in physical activity on a regular basis (Stankov et al., 2012).

Nutritional behaviors are developed at an early age, with the influence of family eating practices and parenting styles (Skelton et al., 2011). Choices about healthy eating are influenced by a lack of urgency about current health decisions impacting future health. Healthy eating is perceived as a temporary fix required to avoid serious health consequences (Stevenson, Doherty, Barnett, Muldoon, & Trew, 2007). Adolescents do not consider it to be a long-term commitment or lifestyle option (Stevenson et al., 2007). General recommendations for healthy eating habits include increasing fruits and vegetables, using age-appropriate portion sizes, and decreasing the amount of added sugars in the diet (Skelton et al., 2011). Adolescent eating choices tend to be based on perceived distaste for healthy foods, lack of convenience, and lack of time (O'dea, 2003; Stevenson et al., 2007). Adolescents report feeling a sense of guilt or failure when they eat unhealthy foods because of the awareness of healthier food options (Stevenson et al., 2007). There may be a lack of motivation to behavior change as demonstrated by the persistence of behaviors from childhood into early adulthood (Larson, Laska, Story, & Neumark-Sztainer, 2012). When less healthful food options are available in the home adolescents are less likely to learn to eat fruits and vegetables (Larson et al., 2012). When fruits and vegetables are available in the home, consumption of fruits and vegetables increases, especially when unhealthful snacks are limited (Larson et al., 2012).

Utility of Motivational Interviewing with Adolescents for Weight Management

Early in a child's life, parents play an important role in influencing their health behavior decisions. Parents shape the environment in the home, including what food and physical activity options are available and by role modeling health behaviors (O'dea, 2003). Parents and other adults reinforce the desirability of unhealthy foods by using them as treats or rewards (Stevenson et al., 2007). As adolescents develop they desire to assert independence from parents and

construct their individual identity (Erickson, Gerstle, & Feldstein, 2005). Adolescents need to learn to feel confident in their ability to make healthy choices, independent of their parents (Stevenson et al., 2007). As adolescent mature the preparation for independence coincides with the developmental process of finding congruence between thoughts, beliefs, values, and behavior (Erickson et al., 2005). Motivational interviewing may be well suited to assist adolescents during this stage of development. Motivational interviewing provides a semi-structured environment for the adolescent to explore their own decision-making process as it relates to health behaviors (Erickson et al., 2005). Depending on the health behavior involved and adolescent's maturity, it may not be necessary for parent to be directly involved in the process (Erickson et al., 2005; Resnicow, Davis, & Rollnick, 2006).

Motivational interviewing has shown to be effective in the reduction of risk-taking behavior in adolescents, in relation to alcohol use (Erickson et al., 2005; Sindelar, Abrantes, Hart, Lewander, & Spirito, 2004). Evidence about adolescents and reducing tobacco use is limited, but increases in self-efficacy were demonstrated (Erickson et al., 2005; Sindelar et al., 2004). Limited evidence suggests that motivational interviewing may be effective for adolescents to increase adherence to special diets and other recommendations to reduce weight and other risk factors (Erickson et al., 2005; Sindelar et al., 2004). Motivational interviewing has also been shown to be effective in promoting healthy nutrition and physical activity in adults, either alone or in combination with other treatments (Martins & McNeil, 2009). Obesity is not a health behavior, but a result of many health behaviors; motivational interviewing would explore the behaviors that contribute to obesity (Resnicow et al., 2006).

As demonstrated above, changing physical activity or nutrition is challenging. Motivational interviewing is a patient-centered communication style focused on around concepts

similar to transtheoretical model, stages of change, and exploration of reasons for resistance and ambivalence to change (Rollnick & Miller, 1995). The transtheoretical model describes health behavior change as a process involving five stages: precontemplation, contemplation, preparation, action and maintenance. Each stage is characterized by a frame of mind and relationship to change that coincides with increased likelihood of successful behavior change. The current stage of change may be identified by listening for “change talk” while discussing the targeted health behavior. During precontemplation, the individual is not concerned about changing the behavior and may not realize the problem associated with the behavior. Contemplation of behavior change is characterized by an awareness of a problem and spending serious time considering the possibilities and how to approach the health behavior change. Preparation involves intention to change the behavior in the near future, with small steps taken toward behavior change. Action includes a change in health behavior, which often requires time and energy expenditure to make a health behavior change. Maintenance is often the longest stage, as it requires the prevention of relapse and continued improvements in the health behavior (Norcross, Krebs, & Prochaska, 2011).

Motivational interviews are semi-structured sessions in which the interviewer offers the interviewee opportunities to explore their feelings of ambivalence about a topic and set their own goals to change their behavior (Rollnick & Miller, 1995). It is important that the interviewer have a good understanding of the interviewee’s stage of readiness to make a change in behavior. The interviewer learns how prepared the interviewee is by listening for “change talk” to indicate their current stage of change (Suarez & Mullins, 2008). The role of the motivational interviewer is to ask questions that assist the individual in identifying their motivation to change (Rollnick & Miller, 1995). Instead of giving advice, the interviewer provides information and the individual

is encouraged to explore their reactions to the new information (Suarez & Mullins, 2008). Direct persuasion goes against the general principles of the communication style (Rollnick & Miller, 1995). Reflective listening encourages the interviewee to develop their beliefs and thoughts, which increase self-efficacy during motivational interviewing (Suarez & Mullins, 2008). Motivational interviewing may be best viewed as a method to assist an individual in preparing for change. A second intervention may be required to implement the desired behavior (Resnicow et al., 2006).

Rolling with resistance, expressing empathy, supporting self-efficacy, and developing discrepancies are the key principles of motivational interviewing. Rolling with resistance allows for the natural tendency to express ambivalence or resistance toward change. It is the role of the motivational interviewing provider to acknowledge the resistance and not confront the issue directly. Expressing empathy allows the motivational interviewing provider to use open-ended questions and reflective listening to understand the adolescent's perspective. Supporting self-efficacy creates an environment in which the adolescent feels more confident about the ability to change by highlighting previous successes. Developing discrepancies occurs early in the motivational interviewing session. The adolescent expresses their values and goals and compares them to their current behavior. In this way, the gap or discrepancy between the goals and the current behavior become evident to the adolescent (MotivationalInterview.org, n.d.). The principles of motivational interviewing prepare the individual for change and support the individual to create the desired change with a second intervention (Rollnick & Miller, 1995; Resnicow et al., 2006).

Tools designed to assist motivational interviewers include rulers to assess various aspects of preparedness for behavior change. Rulers serve as tools to assess readiness-to-change, or the

interviewees perceived stage of change based on the transtheoretical model. Other rulers assess the importance of change or a particular behavior to the interviewee. The interviewee's confidence in their ability to change may also be assessed using a ruler. The interviewee may express their potential to adhere to the new behavior using a ruler assessment. All rulers are based on a scale of zero to ten. Interviewees are asked to indicate their current status using the scale. The interviewer keeps the self-rated score in mind when asking questions to prompt the interviewee to provide reflective explanations about their rating and their motivation that lead to the choices they make (Berg-Smith et al., 1999; Resnicow et al., 2006). This interviewing style helps the interviewee understand their behavior and allows them to decide what behaviors they want to modify to reach their goals. Based on the framework of motivational interviewing, adolescents may set goals related to increasing physical activity or improving eating habits in order to address the behaviors that contribute to obesity.

Research Questions

Research questions include:

1. In what areas has motivational interviewing been successful with adolescents?
2. How do adolescents respond to motivational interviewing?
3. How does motivational interviewing work for multiple behavior changes compared to single behavior changes?
4. Can motivational interviewing be used to promote healthy weight in adolescents?
5. Who is suitable and appropriate to provide motivational interviewing to adolescents?
6. What setting is suitable and appropriate to provide motivational interviewing to adolescents?

Methods

The review examined published literature from 2006 to 2012 to determine the “best practices” for the use of motivational interviewing with adolescents. Potential behaviors addressed in motivational interviewing intervention studies included smoking cessation, alcohol use, medication adherence, and obesity-related behaviors (physical activity, nutrition). In order to address adolescent obesity, the review included search strategies to identify interventions that used motivational interviewing with adolescents to improve health behaviors related to weight.

Search Strategies

PubMed, Cumulative Index to Nursing and Allied Health (CINAHL), and PsycInfo were searched using similar keywords and search criteria. Medical Subject Headings (MeSH) terms included “obesity” with parameters for prevention and treatment and “adolescent” defined as ages 13 to 17 years old. “Motivational interviewing” and “motivational interview” were used as key words. The MeSH term for motivational interviewing was added in early 2013, so it was not utilized in the literature search. Searches were limited to publications dated from 2006 to 2012.

Selection Strategies

Studies were included in the data synthesis if motivational interviewing was included as part of the intervention. Adolescents were defined as age 13 to 17 years old. Interventions were selected that targeted health behaviors, including interventions to address obesity, smoking cessation, and medication regimen adherence. Exclusion criteria removed all interventions using pharmaceutical or surgical methods for obesity treatment and management. The search and selection process, as shown in Figure 1, yielded 43 articles for review and synthesis (Appendix A).

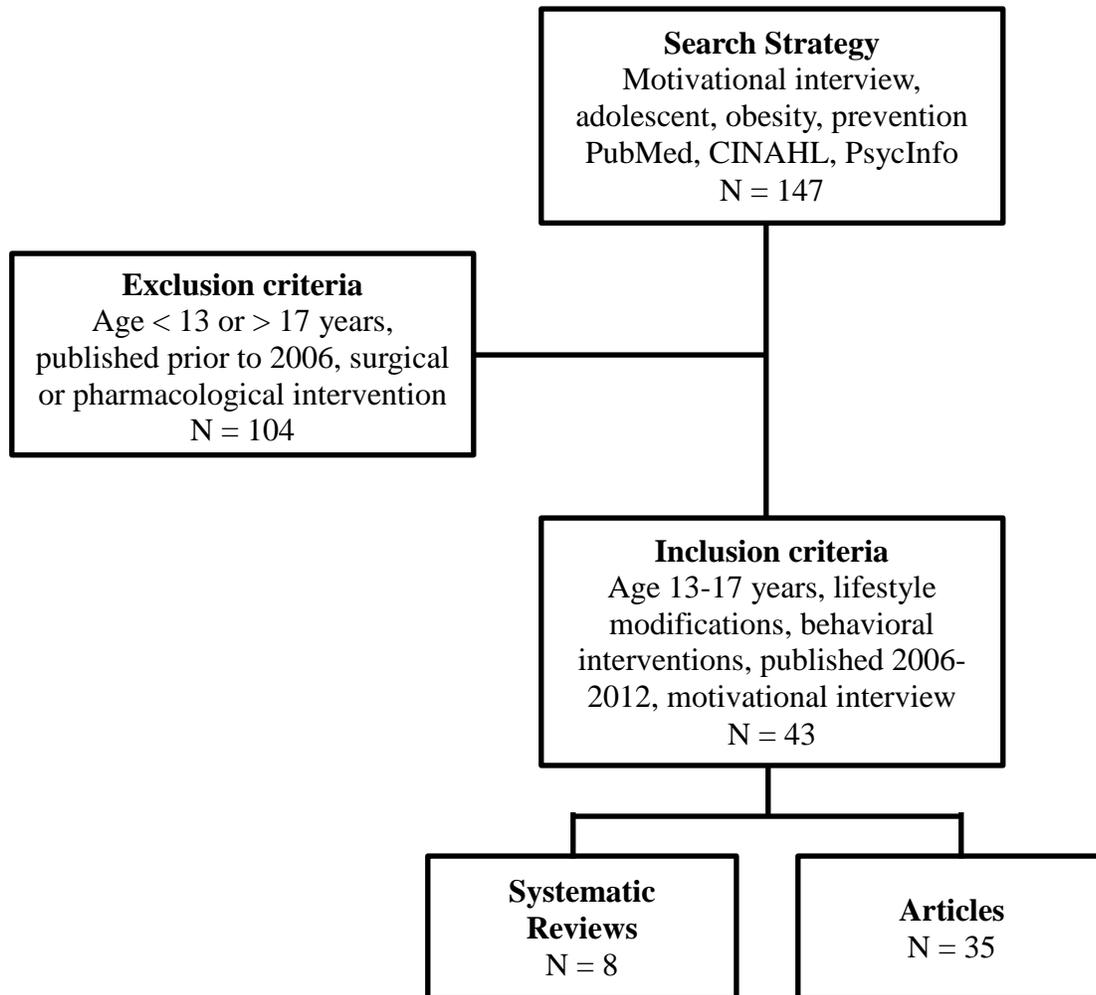


Figure 1. Overall search and selection process

Appraisal of Peer-Reviewed Journal Articles

Variables of interest included the items listed in Table 1. Variables of interest were categorized by the author and a review panel consisting of the author’s culminating experience chair, Dr. Bill Spears, and culminating experience reader, Dr. Miryoung Lee. The review panel contributed their knowledge in the fields of evidence-based public health, childhood and adolescent obesity, and pediatric research to categorize the peer-reviewed journal articles.

Table 1
Variables of Interest

Variable of Interest	Definition
Study Setting	
Setting	community, clinical, school
Target behavior of intervention	lifestyle modification, addiction/substance use
Study design	RCT, case study, feasibility study, pilot study, program description
Motivational Interviewing	
Number of sessions	single, multiple
Duration of session(s)	less than 30 minutes, more than 30 minutes
Interval/Timing of session(s)	less than 6 months, more than 6 months
Assessment of stage of change	yes (stage of change, readiness ruler, confidence ruler), no
Motivational interview provider	peers, community members (counselors, social workers), medical professionals (nurses, physicians, psychologists)
Provider training	training, fidelity assessment, periodic feedback
Communication method	visual (in-person), voice (telephone), text (online chat room)
Demographics	
Age range	adolescents (13-17 years old)
Gender	male, female
Ethnicity	Caucasian, African American, not specified
Psychosocial concerns	depression, behavior disorders
Outcomes	
Primary outcome	BMI, weight, asthma symptom management, smoking cessation
Secondary outcomes	behavior change (long-term, short-term), behavioral antecedents (knowledge, intention, attitude, motivation)
Limitations	length of follow-up, small sample size
Level of evidence	Strongly effective, weakly effective, ineffective

Source: Flynn et al., 2006

Study settings ranged from community settings (community centers, homes), to clinical settings (primary care offices, emergency departments), to schools. Interventions targeting obesity-related behaviors were examined separately from interventions addressing addiction or substance use to determine the behavior changes that led to positive changes in obesity-related outcomes in conjunction with motivational interviewing. As noted earlier, multiple behaviors contribute to weight and obesity, compared to a single behavior associated with smoking or other

substance use. The study design was noted in order to determine the level of evidence (Brownson, Fielding, & Maylahn, 2009).

The number of sessions was classified as one session or multiple sections. The duration of the sessions described the length of time for each motivational interview; time is classified as less than 30 minutes or more than 30 minutes. The interval and timing of the session described the time between sessions and length of follow-up (less than six months, more than six months). The motivational interview provider varied between peers, community members (counselors, social workers, graduate students), and medical professionals (physicians, nurses, psychologists). Although not directly associated with motivational interviewing, Prochaska's stages of change addresses individual health behavior decisions and the process of health behavior change (Norcross et al., 2011). Whether the stage of change was assessed in some way (including readiness ruler or confidence ruler) was classified as yes or no. The communication method included visual (meeting in-person), voice (telephone), text (online chat room), or some combination of the methods. Interviewer training ranged from periodic feedback on motivational interviewing technique, to coding of a sampling of recorded sessions to assess fidelity of treatment, to compressed two day training without follow-up or feedback. In some cases, motivational interviewing provider training was not specified.

Demographic information included age range, gender, ethnicity and psychosocial concerns. The target age range was 13 to 17 years old, although the range extended for some of the peer-reviewed journal articles to include older and younger individuals, so long as the age range primarily included ages 13 to 17 years old. Gender (male, female) and ethnicity were considered as a potential variable of interest in order to examine their impact, if any, on motivational interviewing. Psychosocial concerns were considered to include depression and

behavior disorders (attention deficit hyperactivity disorder) and their impact on behavior change interventions.

The peer-reviewed journal article outcomes were examined for the primary and secondary outcomes. Primary outcomes included weight change, smoking cessation, and asthma management. Secondary outcomes included behavior changes (long-term and short-term) and behavioral antecedent changes (knowledge, awareness, and attitude). Limitations were considered to illuminate any lessons learned or considerations for future interventions. The level of evidence was determined using Brownson's criteria for evidence-based public health (Brownson et al., 2009).

When analyzing the characteristics of the peer-reviewed journal articles, the review panel developed a "preferred" strategy for motivational interviewing based on the literature review and the research questions. The "preferred" strategy for motivational interviewing included multiple in-person sessions with each session lasting more than 30 minutes. The strategy included a preference for peer motivational interview providers in a community setting with periodic feedback on motivational interviewing principles. "Preferred" sessions included some form of assessment of stage of change.

Defining Success

Evidence-based public health.

The principles of evidence-based public health were used to classify results and recommendations from peer-reviewed journal articles and systematic reviews. Peer-reviewed journal articles were classified as "effective" and pilot studies were considered "emerging." Recommendations from systematic reviews were considered "evidence-based" (Brownson et al., 2009). Within the "effective" peer-reviewed journal articles, the strength of evidence was

further delineated based on the results (Table 2). Interventions reporting changes in health outcomes, health behavior or behavioral antecedents were considered strongly effective.

Interventions reporting changes in process measures were considered weakly effective. When no change was reported, the intervention was considered not effective.

Table 2
Classification Based on Evidence-based Public Health

Category	
Evidence-based	Systematic review
Effective	Peer-reviewed journal article
Strongly effective	Change in health outcome, health behavior, behavioral antecedent
Weakly effective	Change in process measure
Not effective	No change reported

Impact ranking.

The results or impact of each intervention were classified into one of seven groups based on the impact ranking (Table 3). The impact ranking categories were established by the review panel to allow for comparison between various published results. When defining the impact ranking, the review panel considered the results and conclusion of the motivational interviewing intervention. The most effective outcome results are ranked highest.

Table 3
Classification of Results and Impact of Intervention

Impact Ranking
Health outcome
Behavior change, long-term
Behavior change, short-term
Change in behavior antecedents
Process measure
No change
No results

Potential health outcomes included BMI or weight change, smoking cessation, and asthma management. Behavior change was separated into long-term and short-term changes.

Long-term changes were defined as changes lasting more than six months after the intervention. A lack of objective guideline to define long-term behavior changes resulted in the definition by the review panel. For this review, long-term included follow-up longer than six months. Short-term changes were defined as changes in behavior with follow-up periods of less than six months or changes in behavior that did not persist for more than six months.

Behavior antecedents included changes in knowledge, intention, attitude, and motivation. These antecedents affect the likelihood of behavior change, but do not constitute behavior change. Process measures were classified separately to include feasibility pilot studies. Process measures include health behavior goal setting by interviewees or self-reported attempts to change health behavior (e.g., attempts to quit smoking).

Areas of success for motivational interviewing with adolescents were identified based on the *impact ranking* and *level of evidence*. Within these areas of success, common features and characteristics were identified as ‘best practice recommendations’ for motivational interviewing strategies with adolescents (Flynn et al., 2006).

Appraisal of Systematic Reviews

Recommendations from systematic reviews were extracted and analyzed separately, as described in Table 4. The other variables of interest allowed for comparison between the systematic reviews to account for variability between the methodologies of the individual reviews (Flynn et al., 2006; Brownson et al., 2009). Additionally, the variables of interest allowed for comparison with the results of the intervention studies. For this reason, the variables of interest in the systematic reviews closely relate to the variables of interest in the intervention studies.

Table 4
Variables of Interest for Systematic Reviews

Category	
Target behavior	lifestyle modification, addiction
Age range	adolescents (13-17 years old)
Study setting	community, clinical, school
Motivational interview provider	peers, community members (counselors, social workers), medical professionals (nurses, physicians, psychologists)
Selection criteria	criteria to be included in review
Exclusion criteria	criteria to be excluded from review
Recommendations	conclusions of review
Limitations	lessons learned and directions for future research

The target behavior was defined as the main behavior discussed during the motivational interviews. The same classification schemes were used for age range and study setting as for the intervention studies. The recommendations or conclusions from systematic reviews were used as supporting evidence for the conclusions of the peer-reviewed journal articles. Systematic review limitations were considered in conjunction with recommendations and overall generalizability to adolescents.

Results

Search and Selection

Using the previously described search strategy, 43 articles were identified for further analysis, including 35 peer-reviewed journal articles and 8 systematic reviews (Figure 1).

According to the principles of evidence-based public health, the following types of evidence were found in the literature search (Table 5).

Table 5
Classification Based on Evidence-based Public Health

Category	# Articles
Evidence-based	8
Effective	35
Strongly effective	24
Weakly effective	4
Not effective	6
No results	1

Based on the impact ranking, all articles were classified into one of seven groups based on the impact ranking (Figure 2).

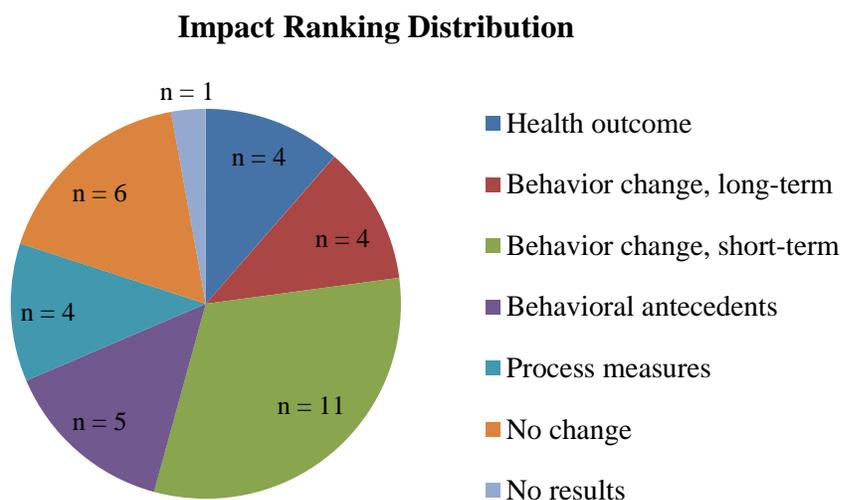


Figure 2. Distribution of impact ranking categories for all peer-reviewed journal articles (N=35)

Motivational interviewing studies were grouped into those that address lifestyle modification (n=14) and those that address addiction behavior (n=21).

Motivational Interviewing Intervention Characteristics

Lifestyle modification studies.

Table 6 examines the characteristics of the interventions that address lifestyle modifications only (not including smoking cessation or substance use) according to the impact

ranking. Multiple motivational interviewing sessions were used consistently across all impact rankings. Sessions lasting more than 30 minutes were used in one-half of the interventions. Long-term follow-up was completed in all lifestyle modifications except the interventions with short-term behavior change. Stage of change was assessed in most interventions (8 of 14), except the interventions indicating process measure changes and no change. There is no clear pattern between type of motivational interviewing provider and the impact ranking. Most interventions (57%) included regular provider feedback on adherence to the principles of motivational interviewing. The type of training for the motivational interviewing provider did not appear to be associated with impact ranking. Most interventions targeting lifestyle modifications included visual (in-person) motivational interviewing sessions (57%) or a combination of visual (in-person) and voice (telephone call) (21%) motivational interviewing sessions.

Table 6
Motivational Interviewing Characteristics in Lifestyle Modification Studies by Impact Ranking

Impact Ranking	# Articles	Multiple Sessions, n	Sessions >30 Min., n	Long-term Follow-up, n	Stage of Change, n	MI Provider	Provider Training	Communication Method
Total	14	13	7	12	8	5 peer, 5 community, 4 medical	8 MI feedback, 1 fidelity, 5 not specified	8 visual, 2 voice, 3 visual + voice, 1 not specified
Health outcome	3	3	2	3	2	1 peer, 1 community, 1 medical	2 MI feedback, 1 not specified	1 visual, 2 visual + voice
Behavior change, long-term	1	1	0	1	1	1 peer	1 MI feedback	1 visual
Behavior change, short-term	3	2	1	1	2	2 community, 1 medical	1 fidelity, 2 not specified	1 visual, 1 voice, 1 not specified
Behavioral antecedent	1	1	1	1	1	1 medical	1 not specified	1 visual
Process measures	3	3	1	3	0	2 peer, 1 community	2 MI feedback, 1 not specified	1 visual, 1 voice, 1 visual + voice
No change	2	2	1	2	1	1 peer, 1 medical	2 MI feedback	2 visual
No results	1	1	1	1	1	1 community	1 MI feedback	1 visual

Addiction studies.

Table 7 examines the characteristics of the interventions addressing addiction only according to the impact ranking. Multiple motivational interviewing sessions and sessions lasting at least 30 minutes were used in 11 of 21 interventions. Long-term follow-up was completed in just over half of the interventions (11 of 21). Stage of change was assessed in most interventions (n=13). Community (n=8) and medical (n=9) were the most common types of providers of motivational interviewing. As with the lifestyle modification studies, peer motivational interviewing providers (n=2) were the least common. Feedback on motivational interviewing was provided in nine of the studies. Fidelity assessment was completed in four of the studies. As with lifestyle modification intervention studies, most motivational interviewing sessions occurred in-person (13 of 21). An additional five studies included a combination of in-person and telephone motivational interviewing sessions.

Table 7
Motivational Interviewing Characteristics in Addiction Studies by Impact Ranking

Impact Ranking	# Articles	Multiple Sessions, n	Sessions >30 Min., n	Long-term Follow-up, n	Stage of Change, n	MI Provider	Provider Training	Communication Method
Total	21	11	11	9	13	2 peer, 8 community, 9 medical, 2 not specified	9 MI feedback, 4 fidelity, 4 training, 4 not specified	13 visual, 2 voice, 5 visual + voice, 1 text
Health outcome	1	1	0	0	1	1 community	1 fidelity	1 voice
Behavior change, long-term	3	2	3	2	0	2 community, 1 medical	2 MI feedback, 1 not specified	3 visual
Behavior change, short-term	8	3	6	2	5	4 community, 3 medical, 1 not specified	5 MI feedback, 1 fidelity, 1 not specified	5 visual, 2 visual + voice, 1 text
Behavioral antecedents	4	1	1	2	3	1 peer, 1 community, 2 medical	1 fidelity, 2 training, 1 not specified	2 visual, 1 voice, 1 visual + voice
Process measures	1	0	1	0	1	1 medical	1 training	1 visual
No change	4	4	0	3	3	1 peer, 2 medical, 1 not specified	2 MI feedback, 1 fidelity, 1 training	2 visual, 2 visual + voice

Overall.

Within each category of impact ranking, study characteristics were summarized to allow inter-intervention analysis (Table 8). The distribution of settings was equivalent for lifestyle modification and addiction studies. A community setting was the least common (5 of 35). School settings were most common (16 of 35), followed by clinical settings (14 of 35). Clinical and school settings were equally common (43% each).

Table 8
Intervention Characteristics by Impact Ranking Categories

Impact Ranking	# Articles	Target of Intervention	Setting
Total	35	14 lifestyle 21 addiction	5 community, 14 clinical, 16 school
Health outcome	4	3 lifestyle 1 addiction	1 community, 1 clinical, 2 school
Behavior change, long-term	4	1 lifestyle 3 addiction	2 community, 1 clinical, 1 school
Behavior change, short-term	11	3 lifestyle 8 addiction	1 community, 5 clinical, 5 school
Behavioral antecedents	5	1 lifestyle 4 addiction	3 clinical, 2 school
Process measures	4	3 lifestyle 1 addiction	1 clinical, 3 school
No change	6	2 lifestyle 4 addiction	1 community, 3 clinical, 2 school
No results	1	1 lifestyle	1 school

Overall motivational interviewing intervention characteristics are illustrated in Figure 3. Twenty-four of 35 interventions used multiple sessions in their motivational interviewing strategies. Single session interventions were used in studies that resulted in short-term behavior or behavioral antecedent change. Sessions longer than 30 minutes were used in one-half of the interventions reviewed. Interventions that resulted in long-term changes (3 of 4 studies), and five of six of those that reported no change were in this category. Long-term follow-up was used

in 21 of the studies. Only 45% (5 of 11) of interventions that resulted in short-term behavior change used long-term follow-up. Sixty percent (21 of 35) of interventions assessed the study participant's readiness to change their behavior. Interventions that reported long-term behavior change or process measures were least likely to have assessed participant's stage of change. The interventions favored motivational interviewing (MI) providers from the community (13 of 35), or medical personnel (13 of 35) to deliver motivational interviews to adolescents. There is no clear preference in type of interviewer used across the impact rankings. The most common type of training for motivational interview (MI) providers was to provide interviewers with periodic feedback about their interview techniques (MI feedback), which occurred in 17 of the 35 studies. Fidelity of treatment was assessed by 14% (n=5) of interventions and 11% (n=4) provided training without follow-up or feedback. Almost one-third of the interventions provided no information about how interviewer training was conducted. There was no apparent preference for the type of training between the different impact rankings. Sixty (n=21) percent of interventions relied on visual (in-person) communication, eight added voice to supplement their communication.

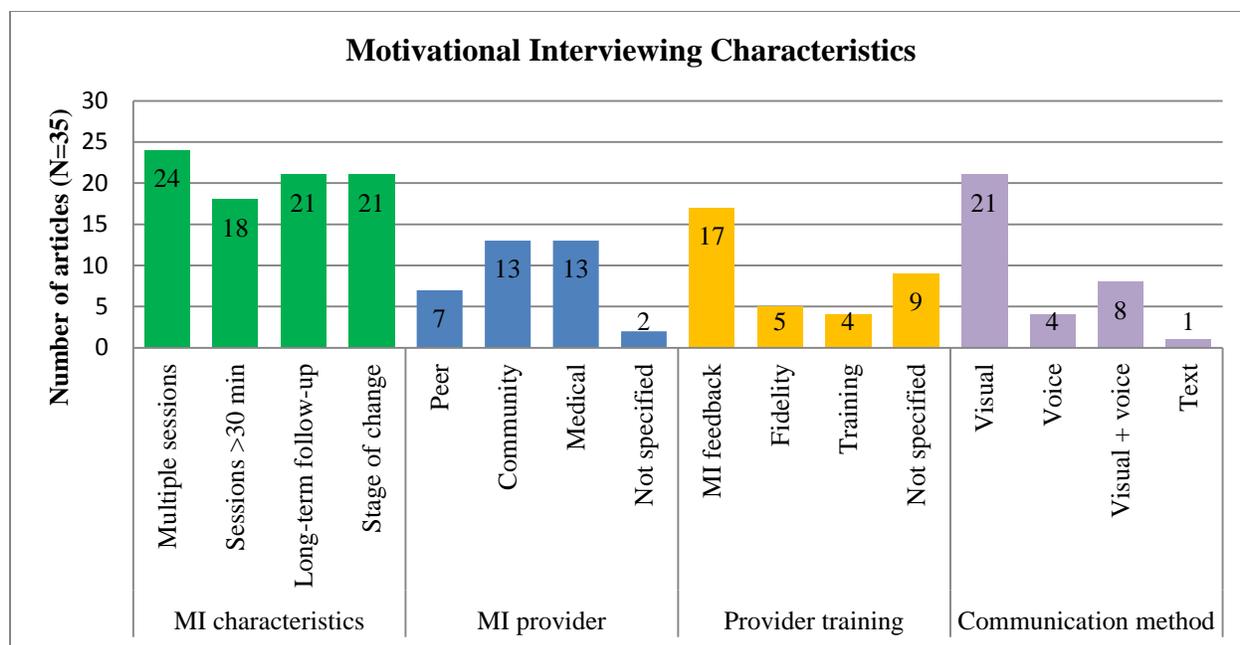


Figure 3. Motivational interviewing characteristics for all peer-reviewed journal articles (N=35)

Systematic Reviews

The eight systematic reviews discussed obesity-related behaviors, addiction, and HIV management in adolescents, as shown in Table 9. Unlike the peer-reviewed journal articles, most of the systematic reviews considered interventions in a medical or clinical setting (5 of 8), including all three systematic reviews exploring lifestyle modifications.

Table 9
Characteristics of Systematic Reviews (N=8)

Target of Intervention	# Reviews	Setting	MI Provider
Obesity-related behaviors	3	3 clinical	3 medical team
Addiction	4	2 clinical, 1 non-school based, 1 not specified	1 nurse, 3 not specified
HIV management	1	1 not specified	1 not specified

Recommendations from three systematic reviews and expert opinions addressing adolescent obesity-related behaviors support the assessment of stage of change and a clinical

setting. Specific parameters of the motivational interviewing sessions were not clearly defined or determined. A potential script or handout was considered as guiding elements for motivational interviewing sessions with adolescents to address obesity-related behaviors (Barlow, 2007; Feinson, Atkinson, & Hassink, 2010). All three systematic reviews on obesity-related behaviors addressed the need to tailor motivational interviewing to the specific patient and family. Parental involvement was mentioned but conclusive evidence is not available to suggest the appropriate level of involvement in a motivational interviewing strategy for adolescents (Barlow, 2007; Feinson et al., 2010; Resnicow et al., 2006).

Systematic reviews of studies that used motivational interviews to address addiction and substance use recommended strategies that included a focus on harm minimization, single, in-person sessions, with long-term follow-up. Authors made recommendations in spite of inconclusive findings. Identified limitations include a lack of specific strategy parameters for the use of motivational interviewing with adolescents and varied experimental design between both studies and reviews.

The review of studies that examined HIV management found moderate evidence to suggest a reduction of short-term viral load and a decrease in unprotected sexual acts result because of motivational interviewing strategies. Evidence was inconclusive on the impact of motivational interviewing on other HIV measures, such as adherence to medication schedules, mortality, and quality of life.

Discussion

This study reviews peer-reviewed journal articles and systematic reviews that used motivational interviewing with adolescents that were published between 2006 and 2012. Behaviors targeted during motivational interviewing included addiction, substance use, asthma management, and lifestyle modifications related to adolescent obesity. The search identified 35 peer-reviewed journal articles and eight systematic reviews for analysis. The impact ranking, established by the review panel, is based on the results and strength of evidence. An impact ranking was determined for each article. The impact was ranked on the strength of the effectiveness of the results, this includes changes in health outcome, health behavior (long-term and short-term), behavioral antecedents, and process measures. Based on the impact ranking, the various intervention characteristics of motivational interviewing strategies were explored. A “preferred” strategy was identified based on articles that discussed the principles of motivational interviewing (MotivationalInterview.org, n.d.). The “preferred” strategy for obesity-related behaviors in adolescents was defined to include multiple motivational interviewing sessions lasting 30 minutes or longer with a peer motivational interviewing provider in a community setting. The “preferred” strategy was used as the benchmark for comparison across all impact rankings.

Motivational Interviewing for Adolescents

Based on the evidence available, motivational interviewing appears developmentally appropriate for adolescents. Motivational interviewing has been used with adolescents to address addiction, substance use, asthma management, school truancy, HIV management, and obesity-related behaviors (nutrition and physical activity) (Peterson et al., 2009; Irby, Kaplan, Garner-Edwards, Kolbash, & Skelton, 2010; Halterman et al., 2011; Cunningham et al., 2012;

Stein et al., 2011; Enea & Dafinoiu, 2009). When addressing single behavior changes, such as addiction or substance use, the motivational interviewing parameters differ from the multiple behavior changes related to obesity, based on recommendations from systematic reviews. Based on the available evidence, the recommended strategy for single behavior changes included a focus on harm minimization, single, in-person sessions, with long-term follow-up (Wachtel & Staniford, 2010). For multiple behavior changes, the evidence recommended the inclusion of the assessment of the stage of change and a clinical setting (Barlow, 2007; Feinson et al., 2010; Resnicow et al., 2006; Gates, McCambridge, Smith, & Foxcroft, 2006; Grenard, Ames, Pentz, & Sussman, 2006; Grimshaw & Stanton, 2006; Wachtel & Staniford, 2010). At this time, however, it is unclear which motivational interviewing intervention characteristics produce successful changes in obesity-related behaviors in adolescents. The motivational interviewing intervention characteristics for multiple behavior changes, especially with obesity-related behaviors tended to include multiple sessions each lasting 30 minutes or longer, which agrees with the “preferred” strategy identified during this study. Large randomized control trials show mixed results, but produce promising evidence indicating the potential for motivational interviewing as a component of a successful intervention to address adolescent obesity (Black et al., 2010; Neumark-Sztainer et al., 2010; Grupp-Phelan, McGuire, Husky, & Olfson, 2012).

Strategies for Motivational Interviews

Provider type.

Potentially, the type of provider conducting the interview with an adolescent could play an important role in intervention outcomes. In order to have successful motivational interviewing outcomes, a trusting and empathetic relationship with the interviewer may be beneficial. There is no clear evidence to support a specific type of motivational interviewing

provider as being most suitable and appropriate for adolescents addressing obesity-related health behaviors. Community and medical motivational interviewers were most common, but there were few studies that used other interviewers. It is possible that additional research could show that peer interviewers are effective.

Training and quality control.

Most of the interventions included information about how motivational interviewing providers were trained. Rollnick and Miller (1995) intended motivational interviewing to be a conversational style, suggesting the training and quality control were essential to ensure the adherence to the spirit of motivational interviewing. Periodic feedback served as the primary method used to ensure interviewers adhered to the principles of motivational interviewing throughout the intervention. It is not clear whether this method is considered to be the most effective mode of ensuring quality or if cost prevents the use of fidelity assessment.

Setting.

The intervention setting may impact an adolescent's ability to attend and engage in motivational interviewing sessions. As with motivational interviewing provider and training, there was a lack of conclusive evidence for the most suitable and appropriate setting for adolescents addressing obesity-related health behaviors based on peer-reviewed articles. Most occurred in a clinical or school setting, although a few occurred in a community setting. All systematic reviews addressing obesity-related behaviors focused on clinical settings, so it is difficult to compare the recommendations from the systematic reviews to the variety of evidence presented in the peer-reviewed journal articles.

Preferred interview strategy.

This study's review panel identified a "preferred" motivational interview strategy. The strategy is that interventions will assess the participant's stages of change to establish an interviewing plan and use multiple interviews lasting 30 minutes or longer. Most studies used these strategies but there is not strong evidence that the "preferred" strategy produced better outcomes. Motivational interviewing may serve as an entry point for the adolescent to increase motivation or progress through the stages of change. The stage of change was assessed in most interventions, either by direct assessment or use of a motivational interviewing ruler. The motivational interviewing rulers ask the adolescent to assess their readiness to change or confidence in ability to change. The "preferred" strategy may serve as an initial motivational interviewing strategy to address obesity-related behaviors with adolescents.

Limitations

A common theme across the interventions was a need for longer follow-up period. In the area of health behavior change research, long-term follow-up at 12 months, 18 months, and 24 months is required to determine the sustainability and persistence of behavior change over time. With multiple follow-up sessions, "booster" motivational interviewing sessions following the conclusion of the intervention may help participants to maintain health behavior changes. Furthermore, changes in health outcomes, as a result of sustained behavior change, require long-term follow-up. It is often unrealistic to expect a change in BMI in less than a year considering the difficulty in maintaining behavior change over time. This may be especially true for pubertal adolescents because they go through a maturation process that impacts their growth. The logistics and resources required for long-term follow-up are scarce considering the paucity of

cohort or longitudinal studies regarding health behavior change. Funders should be encouraged to support interventions that allow much longer follow-up of participants.

The evidence-based systematic reviews and effective peer-reviewed journal articles indicate the lack of evidence to pinpoint specific features that correspond to a successful intervention with motivational interviewing for adolescents (Brownson et al., 2009). At most, the evidence from systematic reviews indicates that motivational interviewing is promising or shows mixed results in addressing health behavior change in adolescents. At this time, more information and evidence is required to determine the ideal characteristics of an intervention targeting addiction, obesity-related behaviors, or other health behavior changes.

Development during adolescent allows for the maturation of self-identity and autonomy from parents. Ultimately, any adolescent under age 18 is part of the home family unit and will be influenced by the parents' decisions in some ways. Their roles with families and peers are somewhat fluid. There is insufficient evidence to determine the roles of parents, families, and peers in adolescent motivational interviewing interventions. Few peer-reviewed journal articles and systematic reviews addressed the role of parents in the intervention at all. Adolescents have learned health-related behaviors from parental role models from a young age (O'dea, 2003). If good nutritional choices or healthy physical activity options are not available in or near the home, it would be difficult for the adolescent to make appropriate obesity-related behavior change.

Recommendations

Motivational interviewing has been effective in addressing obesity-related behaviors such as nutrition and physical activity with adolescents. The intervention should include an assessment for stage of change or similar measure to assess the participant's readiness to change

(i.e., confidence ruler, readiness ruler) to help the interviewer to develop a strategy based on how ready the participant is to change their behavior. The interviews should take place in-person, at least initially to develop a trusting relationship between the adolescent and the interviewer. Motivational interviewers should be provided feedback or fidelity assessment on their adherence to the principles of motivational interviewing, although it is unclear which method to most suitable and appropriate. The recommendations from this study reflect some of the “preferred” strategy characteristics defined by the review panel based on the initial literature review.

Public Health Implications

Behaviors are the most mutable of the determinants of health. However, behavior change is difficult. Passive education and provision of information often are insufficient to result in behavior change. There is large appeal to the more active approach of engaging a person in identifying the strategy they will use to change their behavior. As adolescents develop and mature, their autonomy leads to important decisions about health behaviors (Erickson et al., 2005). This may be an age in which effective strategies will help establish behaviors that will result in healthier lifestyles. Obesity is not the result of a single health behavior, but a result of many health behaviors including nutrition and physical activity. Childhood and adolescent obesity are likely to persist into adulthood with a lack of change in obesity-related health behaviors. Obesity increases the risk for several other chronic conditions including diabetes, cardiovascular disease, and liver disease at an early age of onset than previous generations (Crocker & Yanovski, 2011; Freedman et al., 2007; Singh et al., 2008). Within the public health areas of interest, the built environment and circumstances surrounding adolescents should be considered, although those themes were not discussed in this review. By increasing the

motivation of individuals, it may be possible to elicit change for the entire community to improve health outcomes.

Future Research

Future research should include the assessment of intervention characteristics listed in Table 1 to determine which characteristics lead to a successful intervention for adolescents to address health behavior changes. As a starting point, future interventions should consider multiple sessions lasting at least 30 minutes over a series of weeks to improve motivation.

Conclusions

It is not clear whether motivational interviewing per se or various motivation interviewing strategies would be the best method to prevent obesity and promote healthy weight in adolescents. Motivational interviewing, however, may be an appropriate intervention to encourage adolescents to make better nutrition and physical activity decisions in order to prevent or treat obesity (Barlow, 2007; Black et al., 2010; Irby et al., 2010; Resnicow et al., 2006). As the adolescent progresses through the stages of change, they become more confident in their ability to make physical activity or nutrition choices to improve overall health. By changing nutrition and physical activity behaviors in adolescents, it may be possible to improve their health outcomes later in life. Key characteristics used in interventions that do produce behavior change include a clinical or school based setting, and multiple motivational interviewing sessions that are at least 30 minutes in length. Some evidence indicates the utility of motivational interviewing as a component of a second health behavior intervention to increase physical activity or improve nutrition (Resnicow et al., 2006).

Motivational interviewing is a valuable patient-centered communication style to prepare adolescents for behavior change. Traditionally, western medicine tends to be paternalistic and

prescriptive with advice giving. Motivational interviewing is an empathetic and receptive way to assist individuals in using evidence to make choices. With a different approach and attitude, adolescents may respond well to motivational interviewing strategies, although there is insufficient evidence to support the use of motivational interviewing to address behavior change. At a time when overweight and obesity rates are high in the adolescent population in the United States, more funding for studies with longer follow-up periods to monitor the impact of the intervention using motivational interviewing are required to elucidate the motivational interviewing strategies that lead to successful, sustained behavior change to improve present and future health outcomes.

References

- Barlow, S. E. (2007). Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. *Pediatrics*, *120*(Supplement 4), S164-S192.
- Berg-Smith, S. M., Stevens, V. J., Brown, K. M., Van Horn, L., Gernhofer, N., Peters, E., . . . Smith, K. (1999). A brief motivational intervention to improve dietary adherence in adolescents. the dietary intervention study in children (DISC) research group. *Health Education Research*, *14*(3), 399-410.
- Bernstein, J., Heeren, T., Edward, E., Dorfman, D., Bliss, C., Winter, M., & Bernstein, E. (2010). A brief motivational interview in a pediatric emergency department, plus 10-day telephone follow-up, increases attempts to quit drinking among youth and young adults who screen positive for problematic drinking. *Academic Emergency Medicine*, *17*(8), 890-902.
- Black, M., Hager, E., Le, K., Anliker, J., Arteaga, S., Diclemente, C., & Wang, Y. (2010). Challenge! Health promotion/obesity prevention mentorship model among urban, black adolescents. *Pediatrics*, *126*(2), 280-288.
- Brownson, R. C., Fielding, J. E., & Maylahn, C. M. (2009). Evidence-based public health: A fundamental concept for public health practice. *Annual Review of Public Health*, *30*, 175-201.
- Crocker, M. K., & Yanovski, J. A. (2011). Pediatric obesity: Etiology and treatment. *Pediatric Clinics of North America*, *58*(5), 1217-40, xi. doi:10.1016/j.pcl.2011.07.004; 10.1016/j.pcl.2011.07.004

- Cunningham, R., Chermack, S., Zimmerman, M., Shope, J., Bingham, C., Blow, F., & Walton, M. A. (2012). Brief motivational interviewing intervention for peer violence and alcohol use in teens: One-year follow-up. *Pediatrics, 129*(6), 1083-1090.
- Enea, V., & Dafinoiu, I. (2009). Motivational/Solution-focused intervention for reducing school truancy among adolescents. *Journal of Cognitive & Behavioral Psychotherapies, 9*(2), 185-198.
- Erickson, S. J., Gerstle, M., & Feldstein, S. W. (2005). Brief interventions and motivational interviewing with children, adolescents, and their parents in pediatric health care settings: A review. *Archives of Pediatrics & Adolescent Medicine, 159*(12), 1173-1180.
doi:10.1001/archpedi.159.12.1173
- Feinson, J., Atkinson, A., & Hassink, S. (2010). How a primary care quality improvement initiative is implementing the expert recommendations on childhood obesity. *Delaware Medical Journal, 82*(2), 57-65.
- Flynn, M. A. T., McNeil, D. A., Maloff, B., Mutasingwa, D., Wu, M., Ford, C., & Tough, S. C. (2006). Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with 'best practice' recommendations. *Obesity Reviews, 7*(Suppl. 1), 7-66.
- Freedman, D. S., Mei, Z., Srinivasan, S. R., Berenson, G. S., & Dietz, W. H. (2007). Cardiovascular risk factors and excess adiposity among overweight children and adolescents: The bogalusa heart study. *The Journal of Pediatrics, 150*(1), 12-17.e2.
doi:10.1016/j.jpeds.2006.08.042
- Gates, S., McCambridge, J., Smith, L., & Foxcroft, D. R. (2006). Interventions for prevention of drug use by young people delivered in non-school settings. *Cochrane Database of Systematic Reviews (Online), 1*, CD005030.

- Grenard, J., Ames, S., Pentz, M., & Sussman, S. (2006). Motivational interviewing with adolescents and young adults for drug-related problems. *International Journal of Adolescent Medicine and Health, 18*(1), 53-67.
- Grimshaw, G., & Stanton, A. (2006). Tobacco cessation interventions for young people. *Cochrane Database of Systematic Reviews (Online), (4)*, CD003289.
- Grupp-Phelan, J., McGuire, L., Husky, M. M., & Olfson, M. (2012). A RCT to engage in care of adolescent emergency department patients with mental health problems that increase suicide risk. *Pediatric Emergency Care, 28*(12), 1263-1268.
- Halterman, J., Riekert, K., Bayer, A., Fagnano, M., Tremblay, P., Blaakman, S., & Borrelli, B. (2011). A pilot study to enhance preventive asthma care among urban adolescents with asthma. *The Journal of Asthma, 48*(5), 523-530.
- Irby, M., Kaplan, S., Garner-Edwards, D., Kolbash, S., & Skelton, J. A. (2010). Motivational interviewing in a family-based pediatric obesity program: A case study. *The Journal of Collaborative Family Healthcare, 28*(3), 236-246.
- Larson, N., Laska, M. N., Story, M., & Neumark-Sztainer, D. (2012). Predictors of fruit and vegetable intake in young adulthood. *Journal of the Academy of Nutrition and Dietetics, 112*(8), 1216-1222. doi: 10.1016/j.jand.2012.03.035; 10.1016/j.jand.2012.03.035
- Martins, R. K., & McNeil, D. W. (2009). Review of motivational interviewing in promoting health behaviors. *Clinical Psychology Review, 29*(4), 283-293.
doi:10.1016/j.cpr.2009.02.001; 10.1016/j.cpr.2009.02.001
- MotivationalInterview.org (n.d.). An Overview of Motivational Interviewing. Retrieved June 1, 2013 from

<http://www.motivationalinterview.org/Documents/1%20A%20MI%20Definition%20Principles%20&%20Approach%20V4%20012911.pdf>

- Neumark-Sztainer, D., Friend, S., Flattum, C., Hannan, P., Story, M., Bauer, K., & Petrich, C. A. (2010). New moves-preventing weight-related problems in adolescent girls a group-randomized study. *American Journal of Preventive Medicine, 39*(5), 421-432.
- Norcross, J. C., Krebs, P. M., & Prochaska, J. O. (2011). Stages of change. *Journal of Clinical Psychology, 67*(2), 143-154. doi:10.1002/jclp.20758; 10.1002/jclp.20758
- O'dea, J. A. (2003). Why do kids eat healthful food? Perceived benefits of and barriers to healthful eating and physical activity among children and adolescents. *Journal of the American Dietetic Association, 103*(4), 497-501. doi:10.1053/jada.2003.50064
- Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *The Journal of the American Medical Association, 307*(5), 483-490. doi:10.1001/jama.2012.40; 10.1001/jama.2012.40
- Peterson, A. J., Kealey, K., Mann, S., Marek, P., Ludman, E., Liu, J., & Bricker, J. B. (2009). Group-randomized trial of a proactive, personalized telephone counseling intervention for adolescent smoking cessation. *Journal of National Cancer Institute, 101*(20), 1378-1392.
- Pulgaron, E. R. (2013). Childhood obesity: A review of increased risk for physical and psychological comorbidities. *Clinical Therapeutics, 35*(1), A18-32. doi:10.1016/j.clinthera.2012.12.014; 10.1016/j.clinthera.2012.12.014
- Resnicow, K., Davis, R., & Rollnick, S. (2006). Motivational interviewing for pediatric obesity: Conceptual issues and evidence review. *Journal of the American Dietetic Association, 106*(12), 2024-2033. doi:10.1016/j.jada.2006.09.015

- Rollnick, S., & Miller, W.R. (1995). What is motivational interviewing? *Behavioral and Cognitive Psychotherapy*, 23, 325-334.
- Peterson, A. J., Kealey, K., Mann, S., Marek, P., Ludman, E., Liu, J., & Bricker, J. B. (2009). Group-randomized trial of a proactive, personalized telephone counseling intervention for adolescent smoking cessation. *Journal of National Cancer Institute*, 101(20), 1378-1392.
- Sindelar, H. A., Abrantes, A. M., Hart, C., Lewander, W., & Spirito, A. (2004). Motivational interviewing in pediatric practice. *Current Problems in Pediatric and Adolescent Health Care*, 34(9), 322-339. doi:10.1016/j.cppeds.2004.06.003
- Singh, A. S., Mulder, C., Twisk, J. W., van Mechelen, W., & Chinapaw, M. J. (2008). Tracking of childhood overweight into adulthood: A systematic review of the literature. *Obesity Reviews*, 9(5), 474-488. doi:10.1111/j.1467-789X.2008.00475.x; 10.1111/j.1467-789X.2008.00475.x
- Skelton, J. A., Irby, M. B., Grzywacz, J. G., & Miller, G. (2011). Etiologies of obesity in children: Nature and nurture. *Pediatric Clinics of North America*, 58(6), 1333-54, ix. doi:10.1016/j.pcl.2011.09.006; 10.1016/j.pcl.2011.09.006
- Stankov, I., Olds, T., & Cargo, M. (2012). Overweight and obese adolescents: What turns them off physical activity? *The International Journal of Behavioral Nutrition and Physical Activity*, 9, 53-5868-9-53. doi:10.1186/1479-5868-9-53; 10.1186/1479-5868-9-53
- Stein, L., Lebeau, R., Colby, S., Barnett, N., Golembeske, C., & Monti, P. M. (2011). Motivational interviewing for incarcerated adolescents: Effects of depressive symptoms on reducing alcohol and marijuana use after release. *Journal of Studies on Alcohol and Drugs*, 72(3), 497-506.

- Stevenson, C., Doherty, G., Barnett, J., Muldoon, O. T., & Trew, K. (2007). Adolescents' views of food and eating: Identifying barriers to healthy eating. *Journal of Adolescence, 30*(3), 417-434. doi:10.1016/j.adolescence.2006.04.005
- Strauss, R. S. (2000). Childhood obesity and self-esteem. *Pediatrics, 105*(1), e15.
- Suarez, M., & Mullins, S. (2008). Motivational interviewing and pediatric health behavior interventions. *Journal of Developmental and Behavioral Pediatrics, 29*(5), 417-428. doi:10.1097/DBP.0b013e31818888b4; 10.1097/DBP.0b013e31818888b4
- Voorhees, C. C., Yan, A. F., Clifton, K. J., & Wang, M. Q. (2011). Neighborhood environment, self-efficacy, and physical activity in urban adolescents. *American Journal of Health Behavior, 35*(6), 674-688.
- Wachtel, T., & Staniford, M. (2010). The effectiveness of brief interventions in the clinical setting in reducing alcohol misuse and binge drinking in adolescents: A critical review of the literature. *Journal of Clinical Nursing, 19*(5), 605-620.

Appendix A. Literature Search Results

Peer-reviewed Journal Articles

Health behavior.

- Bean, M., Mazzeo, S., Stern, M., Bowen, D., & Ingersoll, K. (2011). A values-based motivational interviewing (MI) intervention for pediatric obesity: Study design and methods for MI values. *Contemporary Clinical Trials, 32*(5), 667-674.
- Black, M., Hager, E., Le, K., Anliker, J., Arteaga, S., Diclemente, C., & Wang, Y. (2010). Challenge! health promotion/obesity prevention mentorship model among urban, black adolescents. *Pediatrics, 126*(2), 280-288.
- Davis, J., Gyllenhammer, L., Vanni, A., Meija, M., Tung, A., Schroeder, E., & Goran, M. I. (2011). Startup circuit training program reduces metabolic risk in latino adolescents. *Medicine and Science in Sports and Exercise, 43*(11), 2195-2203.
- Enea, V., & Dafinoiu, I. (2009). Motivational/Solution-focused intervention for reducing school truancy among adolescents. *Journal of Cognitive & Behavioral Psychotherapies, 9*(2), 185-198.
- Flattum, C., Friend, S., Neumark-Sztainer, D., & Story, M. (2009). Motivational interviewing as a component of a school-based obesity prevention program for adolescent girls. *Journal of the American Dietetic Association, 109*(1), 91-94.
- Flattum, C., Friend, S., Story, M., & Neumark-Sztainer, D. (2011). Evaluation of an individualized counseling approach as part of a multicomponent school-based program to prevent weight-related problems among adolescent girls. *Journal of the American Dietetic Association, 111*(8), 1218-1223.
- Grupp-Phelan, J., McGuire, L., Husky, M. M., & Olfson, M. (2012). A RCT to engage in care of adolescent emergency department patients with mental health problems that increase suicide risk. *Pediatric Emergency Care, 28*(12), 1263-1268.
- Halterman, J., Riekert, K., Bayer, A., Fagnano, M., Tremblay, P., Blaakman, S., & Borrelli, B. (2011). A pilot study to enhance preventive asthma care among urban adolescents with asthma. *The Journal of Asthma, 48*(5), 523-530.
- Hoek, W., Marko, M., Fogel, J., Schuurmans, J., Gladstone, T., Bradford, N., Van Voorhees, B. W. (2011). Randomized controlled trial of primary care physician motivational interviewing versus brief advice to engage adolescents with an internet-based depression prevention intervention: 6-month outcomes and predictors of improvement. *The Journal of Laboratory and Clinical Medicine, 158*(6), 315-325.
- Irby, M., Kaplan, S., Garner-Edwards, D., Kolbash, S., & Skelton, J. A. (2010). Motivational interviewing in a family-based pediatric obesity program: A case study. *The Journal of Collaborative Family Healthcare, 28*(3), 236-246.

- MacDonell, K., Brogan, K., Naar-King, S., Ellis, D., & Marshall, S. (2012). A pilot study of motivational interviewing targeting weight-related behaviors in overweight or obese african american adolescents. *The Journal of Adolescent Health, 50*(2), 201-203.
- Neumark-Sztainer, D., Friend, S., Flattum, C., Hannan, P., Story, M., Bauer, K., & Petrich, C. A. (2010). New moves-preventing weight-related problems in adolescent girls a group-randomized study. *American Journal of Preventive Medicine, 39*(5), 421-432.
- Rofey, D., Hull, E., Phillips, J., Vogt, K., Silk, J., & Dahl, R. E. (2010). Utilizing ecological momentary assessment in pediatric obesity to quantify behavior, emotion, and sleep. *Obesity, 18*(6), 1270-1272.
- Tripp, S., Perry, J., Romney, S., & Blood-Siegfried, J. (2011). Providers as weight coaches: Using practice guides and motivational interview to treat obesity in the pediatric office. *Journal of Pediatric Nursing, 26*(5), 474-479.

Addiction.

- Barnett, E., Spruijt-Metz, D., Unger, J. B., Sun, P., Rohrbach, L. A., & Sussman, S. (2012). Boosting a teen substance use prevention program with motivational interviewing. *Substance Use and Misuse, 47*(4), 418-428.
- Bernstein, J., Heeren, T., Edward, E., Dorfman, D., Bliss, C., Winter, M., & Bernstein, E. (2010). A brief motivational interview in a pediatric emergency department, plus 10-day telephone follow-up, increases attempts to quit drinking among youth and young adults who screen positive for problematic drinking. *Academic Emergency Medicine, 17*(8), 890-902.
- Colby, S., Nargiso, J., Tevyaw, T., Barnett, N., Metrik, J., Lewander, W., & Monti, P. M. (2012). Enhanced motivational interviewing versus brief advice for adolescent smoking cessation: Results from a randomized clinical trial. *Addictive Behaviors, 37*(7), 817-823.
- Cunningham, R., Chermack, S., Zimmerman, M., Shope, J., Bingham, C., Blow, F., & Walton, M. A. (2012). Brief motivational interviewing intervention for peer violence and alcohol use in teens: One-year follow-up. *Pediatrics, 129*(6), 1083-1090.
- Ha, Y., & Choi, Y. H. (2012). [Effectiveness of a motivational interviewing smoking cessation program on cessation change in adolescents]. *Journal of Korean Academy of Nursing, 42*(1), 19-27.
- Hedman, E., Riis, U., & Gabre, P. (2010). The impact of behavioural interventions on young people's attitudes toward tobacco use. *Oral Health & Preventive Dentistry, 8*(1), 23-32.
- Horn, K., Dino, G., Hamilton, C., & Noerachmanto, N. (2007). Efficacy of an emergency department-based motivational teenage smoking intervention. *Preventing Chronic Disease, 4*(1), 1-12.
- Kelly, A., & Lapworth, K. (2006). The HYP program-targeted motivational interviewing for adolescent violations of school tobacco policy. *Preventive Medicine, 43*(6), 466-471.

- Lando, H. A., Hennrikus, D., Boyle, R., Lazovich, D., Stafne, E., & Rindal, B. (2007). Promoting tobacco abstinence among older adolescents in dental clinics. *Journal of Smoking Cessation, 2*(1), 23-30.
- Lisha, N., Sun, P., Rohrbach, L. A., Spruijt-Metz, D., Unger, J., & Sussman, S. (2012). An evaluation of immediate outcomes and fidelity of a drug abuse prevention program in continuation high schools: Project towards no drug abuse (TND). *Journal of Drug Education, 42*(1), 33-57.
- Mason, M., Pate, P., Drapkin, M., & Sozinho, K. (2011). Motivational interviewing integrated with social network counseling for female adolescents: A randomized pilot study in urban primary care. *Journal of Substance Abuse Treatment, 41*(2), 148-155.
- Norman, C., Maley, O., Li, X., & Skinner, H. A. (2008). Using the internet to assist smoking prevention and cessation in schools: A randomized, controlled trial. *Health Psychology, 27*(6), 799-810.
- Peterson, P., Baer, J., Wells, E., Ginzler, J., & Garrett, S. B. (2006). Short-term effects of a brief motivational intervention to reduce alcohol and drug risk among homeless adolescents. *Journal of the Society of Psychologists in Addictive Behaviors, 43*(6), 466-471.
- Peterson, A. J., Kealey, K., Mann, S., Marek, P., Ludman, E., Liu, J., & Bricker, J. B. (2009). Group-randomized trial of a proactive, personalized telephone counseling intervention for adolescent smoking cessation. *Journal of National Cancer Institute, 101*(20), 1378-1392.
- Spirito, A., Sindelar-Manning, H., Colby, S., Barnett, N., Lewander, W., Rohsenow, D., & Monti, P. M. (2011). Individual and family motivational interventions for alcohol-positive adolescents treated in an emergency department: Results of a randomized clinical trial. *Archives of Pediatrics & Adolescent Medicine, 165*(3), 269-274.
- Stein, L., Colby, S., Barnett, N., Monti, P., Golembeske, C., & Lebeau-Craven, R. (2006). Effects of motivational interviewing for incarcerated adolescents on driving under the influence after release. *The American Journal on Addictions, 15*(Supplement 1), 50-57.
- Stein, L., Lebeau, R., Colby, S., Barnett, N., Golembeske, C., & Monti, P. M. (2011). Motivational interviewing for incarcerated adolescents: Effects of depressive symptoms on reducing alcohol and marijuana use after release. *Journal of Studies on Alcohol and Drugs, 72*(3), 497-506.
- Sussman, S., Sun, P., Rohrbach, L., & Spruijt-Metz, D. (2012). One-year outcomes of a drug abuse prevention program for older teens and emerging adults: Evaluating a motivational interviewing booster component. *Health Psychology, 31*(4), 476-485.
- Thush, C., Wiers, R., Moerbeek, M., Ames, S., Grenard, J., Sussman, S., & Sussman S FAU - Stacy, Alan, W. (2009). Influence of motivational interviewing on explicit and implicit alcohol-related cognition and alcohol use in at-risk adolescents. *Journal of the Society of Psychologists in Addictive Behaviors, 23*(1), 146-151.

Walton, M., Chermack, S., Shope, J., Bingham, C., Zimmerman, M., Blow, F., & Cunningham, R. M. (2010). Effects of a brief intervention for reducing violence and alcohol misuse among adolescents: A randomized controlled trial. *The Journal of the American Medical Association, 304*(5), 527-535.

Woodruff, S., Conway, T., Edwards, C., Elliott, S., & Crittenden, J. (2007). Evaluation of an internet virtual world chat room for adolescent smoking cessation. *Addictive Behaviors, 32*(9), 1769-1786.

Systematic Reviews

Health Behavior.

Barlow, S. E. (2007). Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. *Pediatrics, 120*(Supplement 4), S164-S192.

Feinson, J., Atkinson, A., & Hassink, S. (2010). How a primary care quality improvement initiative is implementing the expert recommendations on childhood obesity. *Delaware Medical Journal, 82*(2), 57-65.

Mbuagbaw, L., Ye, C., & Thabane, L. (2012). Motivational interviewing for improving outcomes in youth living with HIV. *Cochrane Database of Systematic Reviews (Online), 12*(9)

Resnicow, K., Davis, R., & Rollnick, S. (2006). Motivational interviewing for pediatric obesity: Conceptual issues and evidence review. *Journal of the American Dietetic Association, 106*(12), 2024-2033. doi: 10.1016/j.jada.2006.09.015

Addiction.

Gates, S., McCambridge, J., Smith, L., & Foxcroft, D. R. (2006). Interventions for prevention of drug use by young people delivered in non-school settings. *Cochrane Database of Systematic Reviews (Online), 25*(1)

Grenard, J., Ames, S., Pentz, M., & Sussman, S. (2006). Motivational interviewing with adolescents and young adults for drug-related problems. *International Journal of Adolescent Medicine and Health, 18*(1), 53-67.

Grimshaw, G., & Stanton, A. (2006). Tobacco cessation interventions for young people. *Cochrane Database of Systematic Reviews (Online), 18*(4)

Wachtel, T., & Staniford, M. (2010). The effectiveness of brief interventions in the clinical setting in reducing alcohol misuse and binge drinking in adolescents: A critical review of the literature. *Journal of Clinical Nursing, 19*(5), 605-620.

Appendix B. List of Tier 1 Core Public Health Competencies Met

Domain #1: Analytic/Assessment
Identify the health status of populations and their related determinants of health and illness (e.g., factors contributing to health promotion and disease prevention, the quality, availability and use of health services)
Describe the characteristics of a population-based health problem (e.g., equity, social determinants, environment)
Use variables that measure public health conditions
Use methods and instruments for collecting valid and reliable quantitative and qualitative data
Identify sources of public health data and information
Recognize the integrity and comparability of data
Identify gaps in data sources
Adhere to ethical principles in the collection, maintenance, use, and dissemination of data and information
Describe the public health applications of quantitative and qualitative data
Use information technology to collect, store, and retrieve data
Describe how data are used to address scientific, political, ethical, and social public health issues
Domain #2: Policy Development and Program Planning
Gather information relevant to specific public health policy issues
Gather information that will inform policy decisions (e.g., health, fiscal, administrative, legal, ethical, social, political)
Identify mechanisms to monitor and evaluate programs for their effectiveness and quality
Demonstrate the use of public health informatics practices and procedures (e.g., use of information systems infrastructure to improve health outcomes)
Domain #3: Communication
Communicate in writing and orally, in person, and through electronic means, with linguistic and cultural proficiency
Participate in the development of demographic, statistical, programmatic and scientific presentations
Domain #4: Cultural Competency – N/A
Domain #5: Community Dimensions of Practice
Inform the public about policies, programs, and resources
Domain #6: Public Health Sciences
Describe the scientific foundation of the field of public health
Identify prominent events in the history of the public health profession
Describe the scientific evidence related to a public health issue, concern, or, intervention
Retrieve scientific evidence from a variety of text and electronic sources
Discuss the limitations of research findings (e.g., limitations of data sources, importance of observations and interrelationships)
Partner with other public health professionals in building the scientific base of public health
Domain #7: Financial Planning and Management
Adhere to the organization's policies and procedures
Apply basic human relations skills to internal collaborations, motivation of colleagues, and resolution of conflicts
Domain #8: Leadership and Systems Thinking
Incorporate ethical standards of practice as the basis of all interactions with organizations, communities, and individuals
Use individual, team and organizational learning opportunities for personal and professional development
Participate in mentoring and peer review or coaching opportunities