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The Strategic Prevention Framework: Effectiveness of Substance Abuse Prevention System

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2017

Abstract

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The strategic prevention framework (SPF) is a data-driven operating system to assist designing evidence-based substance abuse prevention programs. The study performed here was to assess the effectiveness of the SPF as a prevention planning system. One purpose of this study was to determine the implementation fidelity of the programs that used the SPF process; the other purpose was to assess effectiveness of the SPF process. This study utilized a set of data collected by the national cross site evaluation team on all jurisdictions that implemented the SPF. A subset of communities collected and reported at least 2 pre-implementation and at least 2 post implementation outcomes data. The minimum sample size for the study was determined by using Cohen's *d* criteria. The assessments were performed using both qualitative and quantitative methods by using data collected from multiple levels with a quasi-experimental design. The qualitative data were analyzed using qualitative software with key word searches to examine implementation processes, and the quantitative data were analyzed using descriptive statistics and inferential methods such as Student *t* tests to examine and compare outcomes. Results show that the communities in the study implemented the SPF process with fidelity and that there were changes in desired directions. Factors related to improvements include sufficient internal resources and monitoring follow-through. This research has important implications for social change since substance abuse is a major social issue that has consequences across life span. Recent studies have shown that many behavioral problems have similar risk factors and that improvements for some behavioral problems will most likely have beneficial effects on other related problems.

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Dedication

This study is dedicated to my fellow prevention and public health professionals who work tirelessly to improve lives of those around us.

Acknowledgments

This acknowledgement first goes to those who shaped my life. I thank my grandparents and my parents who made me who I am. I thank my wife, Sarah Changkyung, who has been the wind beneath my wings through numerous difficult times. Now, it is your turn to fly high!

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Chapter 1: Introduction to the Study

The problem of substance use/misuse is one of the leading public health issues in the United States. The term *substance use/misuse* is often used interchangeably with *substance abuse*; however, the Substance Abuse and Mental Health Services Administration (SAMHSA, 2014) has been advocating against the term *abuse* since it considers the term stigmatizing. The Office of National Drug Control and Prevention (2014) has recently clarified the uses of both terms. There are many substances or drugs that alter brain function and behavior, and uses and misuses of these substances have great ramifications on daily lives of individuals and public's health. According to Hyman (2000, p.88), the former director of the National Institute of Mental Health, "seven of the ten leading causes of disability in the United States either involve disorders that drugs are commonly used to treat or involve alcohol, tobacco, or other drug (ATOD) use disorders." An understanding of etiology and extent and depth of the problems involving these substances is crucial in planning and developing effective prevention programs involving substance use, misuse, and dependence.

This chapter provides background on the problem of substance misuse and information on the current status of the development of programs to prevent substance misuse in young people. It also lays the foundation for the importance of examining the problem, purpose of the study, nature of the study, and related research questions. Also included in this chapter is the theoretical framework around program development for substance abuse prevention, definition of terms used in the study, as well as significance of the study.

Background

About 1 in 10 (10.3%) adults residing on the United States misuse or abuse substances during their lives, of which approximately a quarter become dependent on those substances at some point (Compton, Thomas, Stinson, & Grant, 2007). Findings from the 2014 National Survey on Drug Use and Health (NSDUH) reported that 10.2% of Americans 12 years or older were current users of illicit drugs, meaning 27.0 million people in the United States had used an illicit drug during the month prior to the survey in 2014 (Center for Behavioral Health Statistics and Quality, 2015). To put the problem in another context, the age adjusted death rate for drug overdose rose from 6.2 per 100,000 in 2000 to 14.7 in 2014 (Rudd, Aleshire, Zibbell, & Gladden, 2016). The death rate more than doubled over the 15-year period.

Such statistical evidence, coupled with negative health consequences and the socioeconomical cost of misuse and abuse of substances, points to the need for effective prevention strategies. Several studies have shown severe consequences of misuse and abuse of legal and illegal substances. For example, those who drink alcohol excessively show increased risk for death due to liver diseases such as cirrhosis and liver cancer (Menon, Gores, & Shah, 2001), motor vehicle accidents, and cerebrovascular diseases such as stroke (Stahre, Roeber, Kanny, Brewer, & Zhang, 2014). Socioeconomic consequences can be numerous since substance misuse is known to lead to risky behaviors that can lead to poverty, violence, suicide, and homicide (Stein, 1999).

In contrast to the amount of literature on the consequences of substance abuse, literature published over past 30 years on the science of prevention and reduction of uses

of alcohol and other drugs research and theory related to the field have been diffuse and not always systematic. Although there are some researchers who have attempted to ascertain precursors and predictors of adolescents' drinking and drug use, they do not provide any integrated hypotheses or consistent directions for practitioners to apply to designing and planning for effective prevention programs. Significance of this gap is especially dire during the times of limited resources available to communities that need guidance on developing effective prevention programs.

Problem Statement

There are many programs available to communities to prevent or reduce misuse of substance in young people. However, a search of the National Registry of Evidence-Based Prevention Programs (NREPP) database revealed that there are only a few prevention programs that have been adequately evaluated for effectiveness (Park, 2014).

Programs to reduce risky behavior must be data driven and based on evidence. Evaluation of such prevention programs should be performed in structured and systematic ways to examine the overall premise and framework of logic behind the premise. Furthermore, there are only a few frameworks of operations or operating systems that have been published for examination by communities, and even fewer of these operating systems have been evaluated with scientific scrutiny; the Safe Schools/Healthy Students Initiative developed by the U.S. Department of Education (U.S. Department of Education, 2014), Communities that Care (CTC) developed by the Social Development Research Group (SDRG; Center for Communities that Care, n.d.), and PROmoting School-Community-university Partnerships to Enhance Resilience

(PROSPER) developed by National Institute on Drug Abuse (NIDA; Partnerships in Prevention Science Institute, 2017) are some examples of these.

CTC is a coalition-based prevention operating system that helps communities and "their decision makers assess and prioritize risk and protective factors and implement evidence-based programs targeted to prioritized risk factors" (http://www.communitiesthatcare.net/), PROSPER is "a model that facilitates collaboration … in order to mobilize community teams to select and facilitate the delivery of evidence-based interventions to students and their families, starting with middle school youth" (http://helpingkidsprosper.org/about-us). It is important to note that both CTC and PROSPER map to the strategic prevention framework (SPF) developed by the Center for Substance Abuse Prevention (CSAP) of SAMHSA (Flewelling et al., 2016).

Since its inception in 2004, SPF has guided these and many other programs at national and local levels (CSAP, 2004, 2013). Since SPF is a central focal point of these major operating systems, it is critical to understand the framework and scientifically evaluate it for effectiveness. However, very little research has been done on the effectiveness of the framework, especially at community level. This paucity of research has resulted in practitioners not receiving consistent direction to design effective evidence-based substance abuse programs.

In this study, I attempt to address this problem by evaluating the SPF in a systemic way so that such an operating system may be offered to prevention practitioners as a model to designing effective substance abuse programs. I examined the

effectiveness of the SPF system through the correlation of fidelity to the implementation of the SPF process to the systems outcomes for developing effective substance abuse prevention programs across communities that implemented the SPF program.

Most practicing prevention strategy providers and prevention educators are not aware of many of the research findings that form the basis of effective approaches to prevention. Even if they are aware, research findings provide very little guidance on how to implement them. The major premise of this study was that if the SPF is faithfully implemented, ATOD prevention capacity of communities and their coalitions will be strengthened and enable their programs to show positive outcomes. Therefore, I examined effectiveness in two parts: first establishing the fidelity of implementation to the operating system and secondly by examining pre- and post-implementation outcome indicators. Implementation fidelity was assessed by studying how closely the SPF process is being implemented in the communities that are funded through SPF State Incentive Grants (SIGs) and then asked if higher quality implementation is associated with more positive outcomes. Discussions on the significance of the possible findings follow to examine factors that may contribute to changes in outcomes after their implementations.

Measurement of implementation fidelity and implementation outcomes were provided by a series of implementation fidelity (IF) rating scales to study the existing infrastructure and assessing process of the implementation of the SPF steps at the community level. The evaluation team designed these IF scales to permit examinations of important aspects that concern the SPF implementation in communities: (a) Did the

community implement the essential activities within each SPF step and (b) How well did they do them?

Significance

The recent advances in the field of public health have provided excellent models for overall prevention activities by its focus on risk and protective factors. Studies on the prevention of risky adolescent behaviors have similarly focused on risk factors and protective factors associated with these behaviors (Catalano, Berglund, Ryan, Longczak & Hawkins, 2004). Resnick et al. (1997) concluded that the factors that tend to predict failures in school and delinquent behaviors such as drug use, sexual promiscuity, and violence indicated that similar risk factors predicted these constellations of behavioral outcomes in a similar manner. Hawkins and his colleagues (2005) established the need for development of preventive intervention programs guided by theories based on these behavioral findings. For instance, strengthening positive behaviors and teaching parenting skills that emphasized positive interpersonal skills during early years had extensive beneficial effects in early adulthood indicators (Hawkins et al., 2005).

The SPF is a model developed by the CSAP of the SAMHSA. The SPF is a model that systematically links the chain of logical activities that are involved in planning process. The framework integrates knowledge gain through research on the development of behavior and implementation of evidence-based practices. The critical component of the framework is also the linkage of states to share the state-wide epidemiological data and expertise with their communities and articulate the broader impact of SPF processes that are based on evidence. The flow of state- and community-level activities is logically

laid out so that leads to systems change and positive epidemiological outcomes (Orwin, 2000). It is expected that flexibility built into the model also leads to innovations in how programs carry out the five-step process and that activities in the strategic planning process will become evident through the evaluation process. These and other benefits of the implementation of the framework may become evident as more and more programs complete and compare their results throughout their cycles of such strategic planning (McNamara, 2008). The ultimate purpose of this study is to seek such benefits through the evaluation of the effectiveness of the SPF planning process.

SPF and SPF SIG

The functional statement from the CSAP is that it "provides national leadership to States and communities in the development of policies, programs and services to prevent or delay the onset of illegal drug, underage alcohol, and tobacco use" ("Functional Statement", n.d.). As a part of the function, CSAP

> disseminates effective substance abuse prevention practices and builds the capacity of States, communities and other organizations to apply prevention knowledge effectively. An integrated systems approach is used to coordinate these activities and collaborate with other federal, State, public and private organizations. ("What we do", n.d.)

A major CSAP effort toward such promotion is the SPF, and CSAP demonstrated SPF through the SPF SIG program. Notable characteristics of the SPF SIG program are numerous. It is the first major CSAP grant program that incorporated data driven community assessments. It also emphasized the use of epidemiologic data at the

population level to enable a comparison between communities. All of these are carried out with emphasis on sustainability and cultural competency as central themes throughout the process (CSAP, 2004). Figure 1 is a graphic representation of the SPF that characterizes the continuous nature of the process with overarching emphases on sustainability and cultural competence. The figure presented here is a culmination of attempts by staff members at CSAP to graphically represent the SPF process that evolved over time (SAMHSA.gov, 2005).

Figure 1. Graphic representation of the SPF. From SAMHSA.gov (2005)

The impetus for the current exploration of such operating systems as SPF, CTC, and PROSPER grew largely from 2010 and 2011 National Drug Control Strategy, which described the proposed Prevention Prepared Communities program (ONDCP, 2010, 2011). This was an effort to examine and make coordinated efforts to implement a multilevel approach to prevention. One of the ultimate goals was that at the local level the community would select and implement evidence-based mental, emotional and behavioral health promotion/prevention interventions (National Institute on Drug Abuse, 2010) based on empirically determined needs and resources in conjunction with a thorough planning process and demonstrated capabilities to address their local problems.

There are only a handful of these large scale multilevel, multisite prevention operating systems that are available for researchers to review. If the field of prevention is to be globally successful, prevention researchers have to be able to provide communities with guidelines on how to plan effective prevention strategies in such ways supported by evidence.

Purpose of the Study

As discussed in the background section, most practicing prevention strategy providers and prevention educators are provided little guidance on theoretical foundations on the development of programs to prevent substance use/misuse. In this study, I attempted to address these problems through an evaluation of one of the major operating systems, the SPF, in a systematic way so that such a model may be offered to prevention practitioners to enable them to design effective evidence based substance use/misuse prevention programs.

The first step of the study is to determine effectiveness of the framework. Therefore, I examined the system through the correlation of fidelity to the implementation of the SPF process to the systems outcomes. The ultimate purpose of the study was to examine how the research can be translated into practice by finding the avenues to promulgate effective prevention frameworks for distribution to prevention practitioners for developing effective substance abuse prevention programs. In another words, my expressed desire was to serve as a critical bridge from the research world to the practical world so that practitioners can reasonably be assured that they may use SPF to guide the development of community programs to prevent substance misuse.

Along with the recruitment of states to participate in SPF SIG program, CSAP also planned for concurrent evaluation of the program. A national evaluation team was formed in conjunction with researchers from the National Institute on Drug Abuse (NIDA) in 2004 (CSAP, 2004). A multilevel evaluation plan with a quasi-experimental design was developed with an expressed desire to evaluate the model as well as the effectiveness of the SPF SIG through the observation of the implementation of the SPF SIG program (CSAP, 2010). This also provided added ability to study interactions between states and their communities.

The design used both quantitative and qualitative data (CSA), 2010). The qualitative data collection was designed to study the infrastructure and implementation processes, and the quantitative outcomes data was designed to compare and contrast systems outcomes at the state and community levels before and after implementation. The scope of this study was limited to examining processes and outcomes from communities across selected states that have completed their implementations of SPF. Taking this snapshot of selected states that completed their implementations provided enough information to assess the effectiveness of the framework.

Nature of the Study

Effectiveness of the SPF program was assessed in states that have implemented the program and completed the pre- and post-implementation outcome data. Selection of states was limited to those states that completed their implementations, continued to submit post-implementation data for at least 2 more years, and participated in post-implementation sustainability studies. The scope of the evaluation cuts across states and

within states across communities. The design used both qualitative and quantitative data. Qualitative data on infrastructure and implementation processes, and quantitative data on systems outcomes were examined at the state and community levels before and after implementation.

Research Questions

One of the main questions of the evaluation was to identify what makes a substance abuse prevention system a strong and effective one. This required the use of a series of indicators and measures that evaluate each community's activities in their infrastructure and served as indicators of a community's capacity to prevent substance use/misuse and their respective challenges.

I began by attempting to ascertain the degrees of implementation fidelity to the framework. While some of the indicators and measures, by necessity, are qualitative in nature, they were coded in scales to reflect the degree of fidelity to the framework in quantitative ways. Impact questions delved into the measurement of effectiveness by comparing quantitative outcomes data selected from pre- and post-epidemiological data collected longitudinally. The data source for this study was a part of the sets of data accumulated by the national cross site evaluation team from 2004 through 2013 on behalf of CSAP and deposited to the Inter-University Consortium for Political and Social Research (ICPSR) (2013).

Questions centered around two major purposes of this study: (a) to what extent were community programs implemented with fidelity, and (b) what changes occurred across the programs that implemented the programs for substance abuse prevention using

the SPF process? Embedded in these research questions was the concept of data driven planning in SPF that asked the following: To what extent was the selection of prevention programming appropriate to local level problems, needs, and resources based on data collected as a part of a systematic assessment?

Question on Fidelity to Implementation of SPF Process

Indicator: To what extent were selected communities implemented with fidelity?

Measure: Fidelity scale in each of the five steps of the SPF.

Impact Questions

Question #1: To what extent did SPF lead to community level improvements on outcomes?

Question #2: What accounted for variations in outcomes across communities?

Outcomes Indicators and Measures

Indicator 1: To what extent did SPF improve performance outcomes?

Measure 1: Prevalence rates of alcohol use and other drug use data communities chose.

Indicator 2:What accounted for variation in outcomes in SPF communities?

Measure 2:Associated community factors before and after implementation (these would vary on the indicators that individual communities target).

Theoretical Framework

The goal of this research was to expand and improve the knowledge base. There have been many scientific studies to broaden the knowledge base in understanding the patterns of behaviors leading to substance abuse (Catalano et al., 2004; Hawkins et al.,

2005). These investigations have been approached from many different perspectives; research studies (a) focused on improving individual and population based health, (b) focused on systems, policy and political perspective, and (c) focused on organization and delivery of health care.

All approaches are important in understanding substance abuse in making policies on guiding communities and organizations on how to plan effective programs to prevent and intervene against substance abuse. These approaches are also important in evaluating programs to decide whether they are effective and efficient. These perspectives are like components of a three-legged stool where all three legs are equally important to construct a stable and strong stool. Since the reasons behind substance abuse are multifactorial, the research to understand the problems must also be multifaceted (Friese & Grube, 2008).

What is more important to understand in social sciences research is that these perspectives only form the most basic foundations for understanding the social phenomena of interest. In applied sciences, there is a need for translational research that seeks to advance applied goals by incorporating theories, findings, or methodologies drawn from basic behavioral science. Therefore, the goal in the behavioral health arena is to shepherd research from basic investigations to more clinical and applied studies.

All programs designed to prevent and reduce substance abuse in adolescents must have core theoretical framework behind reasons for behaviors that lend to substance abuse. Conversely, various theories and hypotheses endeavor to describe characteristics that are considered to be risk factors predictive of substance using behaviors. More

comprehensive descriptions of various theoretical frameworks that attempt to explain the substance use behaviors are discussed in Chapter 2 of this document in detail.

The theoretical framework behind the SPF largely derives from the social development model (SDM) developed by researchers at the SDRG. Catalano and Hawkins (1996), the leaders of SDRG, defined the SDM as "a theory of human behavior that is used to explain the origins and development of delinquent behavior during childhood and adolescence" (p. 146). The SDM attempts to ascertain whether children will develop with constructive tendencies or with antisocial behavioral patterns by examining the presence of risk factors and protective factors as they age (Brown et al., 2005). Numerous researchers demonstrated the validity of SDM and applied it to develop programs for children and adolescents across race and gender (see Choi, Harachi, Gilmore, & Catalano, 2005; Fleming, Catalano, Oxford, & Harachi, 2002).

SPF attempts to advance the premises behind the risk factors and protective factors in communities from the theoretical framework level to the practice level by using a five-step planning process starting from data driven assessment and using logic models with a sound theoretical framework of understanding risk factors, protective factors, and other intervening variables at community levels. CSAP's initiative to advance the concept of the SPF through a series of grants to states has been in existence for more than 5 years. More detailed discussion on data sources and study design are presented in Chapter 3 of this dissertation.

Operational Definitions

Adaptation: The act or process of changing to better suit a situation ("Adaptation", n.d.). Modification made to a chosen intervention; changes in audience, setting, and/or intensity of program delivery. Research indicates that adaptations are more effective when underlying program theory is understood; core program components have been identified; and both the community and needs of a population of interest have been carefully defined (CADCA, 2007c).

ATOD: Acronym for alcohol, tobacco, and other drugs.

Baseline: "A value representing a normal background level or an initial level of a measurable quantity and used for comparison with values representing response to an environmental stimulus or intervention." ("Baseline", n.d.).

Capacity building: "Increasing the ability and skills … to plan, undertake, and manage initiatives. The approach also enhances the capacity of the individuals, groups, and organizations to deal with future issues or problems." (CADCA, 2007b, p. 41).

Coalition: "A formal arrangement for cooperation and collaboration between groups or sectors of a community, in which each group retains its identity but all agree to work together toward a common goal of building a safe, healthy, and drug-free community." (CADCA, 2007b, p. 41).

Community: "A group of individuals who share cultural and social experiences within a common geographic or political jurisdiction . For example, a neighborhood, town, part of a county, county, school district, congressional district or regional area" (CSAP, 2000). For the purpose of this study, communities in the study are are also called

community subrecipients or community partners since these communities were selected by individual states and funded by the states. These terms may be used interchangeably.

Community readiness: "The degree of support for or resistance to identifying substance use and abuse as significant social problems in a community. Stages of community readiness for prevention provide appropriate frameworks for understanding prevention readiness at the community and state levels" (CSAP, 2000, p. 24).

Culture: "The shared values, traditions, norms, customs, arts, history, folklore, and institutions of a group of people that are unified by race, ethnicity, language, nationality, or religion" (CADCA, 2007f, p. 41).

Cultural competence: A set of academic and interpersonal skills that allow individuals to increase their understanding and appreciation of cultural differences & similarities within, among & between groups (see CADCA, 2007f, p.41; Orlandi, Weston, & Epstein, 1992).

Cultural diversity: "Differences in race, ethnicity, language, nationality, or religion among various groups within a community" (CADCA, 2007f, p.41).

Cultural sensitivity: An awareness of the nuances of one's own and other cultures.

*Effectiveness: "*The degree to which objectives are achieved and to extent to which targeted problems are solved." (effectiveness, n.d.) .

Environment: "In the Public Health Model, the environment is the context in which the host and the agent exist. The environment creates conditions that increase or decrease the chance that the host will become susceptible and the agent more effective"

(CADCA, 2007f, p.42). In the case of substance abuse, the environment is a societal climate that encourages, supports, reinforces, or sustains problematic use of drugs.

Evaluation: A process that helps prevention practitioners discover the strengths and weaknesses of their activities so that they can do better over time. Time spent on evaluations is well spent because it allows groups to use money and other resources more efficiently in the future. Some evaluations can be done at little or no cost, and some can be completed by persons who are not professional evaluators. (see CADCA, 2007e, p. 25) (McKenzie, Neiger, & Thackery, 2009, p. 338).

Evidence-based practice: "The integration of best-researched evidence and clinical expertise with patient values" (IOM Committee on Quality of Health Care in America, 2001, p.89).

Expected outcomes: "The intended or anticipated results of carrying out program activities. There may be short-term, intermediate, and long-term outcomes" (McKenzie et al., 2009, p. 370).

Fidelity: Agreement (concordance) of a replicated program model or strategy with the specification of the original (CSAP, 2000).

Goal: A broad statement of what the coalition project is intended to accomplish (e.g., delay in the onset of substance abuse among youth).

Impact evaluation: "Evaluation that examines the extent of the broad, ultimate effects of the project" that is, did youth drug use decrease in the target area? (McKenzie et al., 2009, p. 340).

Logic model: "A comprehensive and sequential method of moving from defining needs to developing goals, objectives, activities, and outcome measures. The Logic Model shows the link between each component" (CADCA, 2007c, p.26).

Need assessment: "A systematic process for determining and addressing needs, or 'gaps' between current conditions and desired conditions or 'wants'… The discrepancy between the current condition and wanted condition must be measured to appropriately identify the need" (CADCA, 2007a, p. 26).

Objectives: What is to be accomplished during a specific period of time to move toward achievement of a goal, expressed in specific measurable terms.

Outcome evaluation: "Evaluation that describes the extent of the immediate effects of project components, including what changes occurred" (McKenzie et al., 2009, p. 340).

Process evaluation: "Evaluation that describes and documents what was actually done, how much, when, for whom, and by whom during the course of the project" (McKenzie et al., 2009, p. 340).

Protective factors: "Those factors that increase an individual's ability to resist the use and abuse of drugs, e.g., strong family bonds, external support system, and problem-solving skills" (SAMHSA, 2009, p. 27).

Risk factors: "Those factors that increase an individual's vulnerability to drug use and abuse, e.g., academic failure, negative social influences, and favorable parental or peer attitudes toward or involvement with drugs or alcohol" (SAMHSA, 2009, p. 27).

Social development model (SDM): "A theory of human behavior that is used to explain the origins and development of delinquent behavior during childhood and adolescence" (Catalano et al., 2004, p.89).

Substance misuse (substance abuse)/Substance use disorder (SUD): The use of substances or drugs for other than approved or intended purposes or abuse of illegal drugs; the abuse of inhalants; or the use of alcohol, tobacco, or other related product as prohibited by State or local law (Kelly, Dow, Westerhoff, 2010; SAMHSA, 2004).

Sustainability: The likelihood of a program or effort to continue over a period of time, especially after completion of implementation of program (CSAP, 2004).

Target group: "Persons, organizations, communities, or other types of groups that the project is intended to reach" (CADCA, 2007a, p. 27).

Scope, Assumptions, and Limitations

Scope and Assumptions

As CSAP launched the SPF State Incentive Grants to facilitate the implementation of SPF, CSAP concomitantly launched cross site evaluation of the grant program (CSAP, 2004). The national SPF SIG Cross Site Evaluation team, composed of researchers from CSAP and NIDA in cooperation with research organizations such as Westat and Pacific Institute for Research and Evaluation, was tasked to collect data over the life of first two cohorts of SPF SIG implementation (CSAP, 2004).

The multilevel analysis used the secondary analysis of a portion of the database composed of data collected over a 9-year period. Much of the data were mined from the massive data sets that were collected, cleaned, organized, and deposited into the ICPSR

archives by the national SPF SIG cross-site evaluation team (ICPSR, 2013). National, state-level, and local-level epidemiological and demographic data served as the basis of comparison to data collected from states and communities that implemented the SPF.

The national cross site evaluation study team collected process and outcomes data from state level and community level programs that implement SPF programs. The study team also collected outcomes data on populations that are targeted by communities. Some communities also collected and reported on outcomes data on the target population of their choosing since the ultimate purpose of the SPF implementation is to reduce and prevent use of alcohol and other drugs in these communities (CSAP, 2013). There were enough data collected from the first cohorts of states and their communities to evaluate the impact of the implementation of SPF over the full length of the grant program by comparing at least two points of measurment, one at baseline and another after the implementation of SPF.

Communities that submited data were selected by state level SPF SIG grantees based on their individual selection criteria. The selection criteria were neither dictated by SAMHSA nor the national evaluation team to provide the most flexibilty. Since the communities were selected by individual states and funded by the states, they may be referred to as community subrecipients, “community coalitions (CC), or community partners (CP), and these terms have been used interchangeably in this study. The communities outcomes data such as consumption data or consequences data selected to monior for their intervention programs were approved by their state authorities. These

data are compared to corresponding data collected from simlar national data collection systems such as Monitoring the Future (MTF; 2015) and NSDUH (SAMHSA, 2014).

Since sustainability is a key component of the SPF process, it is important to mention that the evaluation of factors that facilitate sustainability is important information to be gained from the study. One of the sustainability question asked here is whether successful execution of data driven decision-making at the state level filter down to success in at the community level. That is the question of whether community interventions had any impact on population outcomes desired from targeted priorities on consumption and consequence (Birckmayer et al., 2004).

Limitations

There are many challenges to such evaluation studies since these are not controlled studies. As noted before, flexibilities have been built into data collection, and the observations are made in the open system. These challenges are not just limited to substance-related harm prevention. Issues with data quality, missing data, losses to follow-up, and data linkage problems are not unique to data collections in behavioral health but occur across multiple public health disciplines (Alciati & Glanz, 1996; Amaro et al., 2005). Because much of the process evaluation required the collection of qualitative data, there was careful planning to ensure the reliability in coding across all process data collected without bias.

Some limitations exist since it is impossible to ensure that all programs that implemented SPF follow the standard suggested format. This limitation is particularly relevant for activities pertaining to the assessment step because of the possibility for

recall bias. A recall bias is a type of bias that is particularly concerning in retrospective research such as this since the data collection involves recall of prior events that can lead to misclassification whether the event happened before or after implementation (Last, 2000, p. 153).

Another possible limitation to this kind of observational study is the inability to extrapolate the program impact from small group sizes. Given the possibility that many intervention programs may be provided to a small population with a limited time frame, they may not achieve impact on population-level indicators. It may take a compilation of many similar results from the problems communities addressed to demonstrate population-level effects in substance use and related risk behaviors that can be attributed to the implementation by communities.

Ongoing Challenges

Some of the other on-going challenges include that of subjectivity of self-report as opposed to direct measurement and reporting over time (Greenlund et al., 2005). Limited sample size is also a barrier. Gold et al. (2008) found that small sample sizes was a significant barrier to generating state level and local level estimates for specific subgroups. This statement is consistent with the concerns of the national cross-site evaluation team on its state level and community level substance-related data.

Barriers to SPF implementation often go beyond data issues. The interplay of politics and local capacities also play important roles in how closely SPF is implemented. For example, state evaluators have worked hard to recommend the equitable distribution of SPF SIG funds to communities based on need (Wyoming Survey and Analysis center

(WYSAC), 2011). However, the governor of that state intervened to fund all counties equally (WYSAC, 2011). Workforce development issues such as the lack of skills in data use among planning stakeholders and reluctance to embrace new technology by key stakeholders can hinder the process. A lack of clarity in directions at local level and differing interpretations of rules and regulations are some of the other examples of barriers to effective planning (CSAP, 2013).

Further, the concept of data-driven priority setting cannot be considered to be the solution to all problems. The jurisdictions often find numerous topics they discover overwhelming, reflecting the complexity of the prioritization process. They may discover some data may not reflect their perceptions, and strategies of choice may require adjustments in making relative comparisons across different substance use patterns and consequences (Flewelling, Birckmayer, & Boothroyd, 2009).

Summary

There are only a handful of the large scale multilevel, multisite prevention operating systems that are available for researchers to review: the PROSPER designed by the collaborative efforts of NIDA and University of Michigan (Spoth, Redmond, Hockaday, & Yoo, 1996), the CTC developed by the SDRG (Hawkins & Catalano, 1992), and the SPF developed by the SAMHSA (CSAP, 2004), among others. If the field of prevention is to be globally successful, prevention researchers have to be able to provide communities with guidelines how to plan effective prevention strategies. Providing a framework for designing effective, data driven, evidence based substance

abuse prevention programs at the community level should mark a great start toward that goal.

Chapter 2: Literature Review

Introduction

A review of the literature is a combination of four tasks in one. Reviewers have to first make decisions on the depths and breadths of topics of documents to review and second must understand the content of the literature. Reviewers then must evaluate the ideas, concepts behind the ideas, research methods, and results presented in all the literature they read. The task gets more complex as reviewers must also be able to describe the content and critically analyze the merits of the literature in their own words.

This literature review chapter is organized by topic, starting from the more general topic of problems of substance abuse in adolescents, background and history of research on behavioral health of adolescents, prevention of substance abuse among youths and then to an examination of the theories behind the research on prevention strategies. In the literature review, I focus primarily on the SPF and on the evaluation of the effectiveness of existing programs.

Approach of Literature Search

The process of preparation for the review of the literature started by topical organization of the existing collection of published articles that ranged from classic review articles to original research articles in various related subjects into a series of annotated bibliographies. Since these were mostly academically representative but dated articles, widely available search engines such as PubMed, MEDLINE, EBSCO, and several popular literature and citation indices such as Addiction Abstracts, Excerpta Medica, Index Medicus, Science Citation Index, and Social Sciences Citation Index,

among others, were used for more recent articles using author names and associated key words as starting points.

Database Search Criteria

Much of the database research strategy was adopted from Garrard's matrix method (2006). Since I focused on the prevention of adolescent substance abuse, the core of matrix of search of literature began with the prevalence of substance abuse in adolescents. The literature search on prevalence data is relatively easy because readily available current epidemiological statistical data by age, gender, race, and ethnicity derived from numerous survey data collection systems such as NSDUH, MTF, and Youth Risk Behavior Survey (YRBS), among others.

The initial approach to the literature survey on theoretical background material was chronologically reversed in contrast to searches of epidemiological data. Whereas a search for epidemiological data most often begins with the most current data, the most logical beginning of a literature survey starts with scanning classic textbooks, reference books, and review articles. After gaining a foundational background, the next step was to use key words taken from the initial search to seek primary source documents by using search engines such as MEDLINE. It is a good idea to use restrictive criteria since searches starting with broad key word searches likely return huge numbers of hits (Garrard, 2006). Once researchers are confident of where they are going, the next step could be use of citation indices. Given that some authors are identified and cited often by other researchers, a citation index can be used to generate lists of papers that are published by original authors up to present time.

Some researchers suggest restricting literature searches to most recent publications and to look out for upcoming papers in press as to not to miss the most current works (Pautasso, 2013). However, the use of chronology as a restrictive criterion may select out some of the classic original studies that provide useful background to the field of research. Old literature is not necessarily bad. For this literature review, a balance between older classic articles and current research articles has been sought.

As the literature search becomes more complex, terms and definitions of the search may evolve and may necessitate a modification of original search strategies. For example, the initial search began with key words such as *substance abuse, underage drinking, risk and protective factors,* and *risky behaviors*, but they yielded a series of divergent key words such as *prescription drug misuse, adolescent development, gateway drugs,* and *Strategic Prevention Framework*. These terms further spawned conceptual terminologies such as *cultural norms, social development model, social ecological theories, logic models, contributing factors*, and *intervening variables*, among others. These, in turn, provided the background for literature searches on theoretical frameworks behind specific program development.

In addition, some of the most important sources of recent articles in the field were collected by scanning professional periodicals and peer reviewed journals. Scanning current general scientific journals such as Nature and Science provides general overview updates and a review of widely available public health and medical journal publications provide more focused updates. These include weekly periodicals such as Morbidity and Mortality Weekly Reports, Public Health Reports, and monthly journals such as

American Journal of Public Health, Journal of American Medical Association, and New England Journal of Medicine. Further scans of journals focused on alcohol and other substances of abuse such as Addiction (official publication of the Society for the Study of Addiction), Alcohol, Drug Abuse Weekly, Alcohol Research and Health (official journal of the National Institute on Alcohol Abuse and Alcoholism), American Journal of Preventive Medicine (official journal of the American College of Preventive Medicine), Journal of Studies on Alcohol and Drugs (a publication of the Center of Alcohol Studies of the Rutgers University), Substance Abuse (the official Journal of the Association for Medical Education and Research in Substance Abuse), and official periodical publications from organizations and agencies that serve the field are done on regular basis.

More focused strategies of searches of literature generally originate from searches of papers from specific organizations or authors whose names are often mentioned and referenced by authors of recent manuscripts of note. Many of the classic articles are dated and are commonly thought to be too old and less desirable for reports such as doctoral dissertations. However, it should be noted that these articles serve useful purposes since they provide a historical background and basis for the future direction of on-going research by others. Thus, these dated manuscripts provide context for research topics by guiding searches for similar articles by authors, contemporaries, or associated colleagues that are published more recently. For example, a review of an article originating from the SDRG (Hawkins, 1995) opened a floodgate of more recent peer reviewed journal articles on healthy behaviors and social development patterns of youths

(Catalano et al., 2005; Choi et al., 2005). A review of the article on "Good Behavior Games" (Kellam, Rebok, Ialongo, & Mayer, 1994) opened a similar floodgate of recent peer reviewed journal articles by Kellam and his colleagues (Kellam et al., 2011; Kellam et al., 2008; Poduska et al., 2008

Problems of Substance Misuse/Abuse

The true size of the substance misuse problem has been a matter of intense debate for ages. In the 1960s, there was a rise in the uses of marijuana and psychedelic drugs such as LSD (Lowinson, Ruiz, Millman, & Langrod, 2005) and reports from the President's Advisory Commission on Narcotics and Drug Abuse (https://www.ncjrs.gov/App/Publications/abstract.aspx?ID=164685) made recommendations to combat the problem. Other drugs such as amphetamine, methamphetamine, crack cocaine, and barbiturates became popular street drugs during the 1990s (Lowinson et al., 2005). The number of heroin users increased approximately 180% between 2005 and 2014 (SAMHSA, 2015), and in 2015, results of the NSDUH survey estimated that almost 45% (119 million) of Americans 12 years or older had used prescription opioids in the past year (SAMHSA, 2016). According to the surgeon general of the United States, "more than 2 million people in the United States are addicted to prescription opioids and more than 12 million report having misused these medications in 2015" (Murthy, 2016, p.2413). This unprecedented recent rise in opioid uses gives credence to the popular notion of drug culture and linking substance abuse and misuse problems with the youth counterculture (Musto & Korsmeyer, 2002).

Prevalence of Substance Use During Adolescence

In considering human life cycles, the adolescent period is the time of life from approximately 12 years of age to 17 years of age, demarcated from puberty to the young adult stage. It is a period of transition from childhood to adulthood, change, and growth (MacKay & Duran, 2007). It is a period in which adolescents have opportunities to engage in risky behaviors such as the initiation of alcohol and other substances. These patterns of behaviors leading to substance use may have short-term and long term consequences in the quality of lives of adolescents and their health.

The problem of substance misuse among adolescents is one of the leading public health issues in the United States. The most commonly misused substances among adolescents are alcohol and tobacco. It is especially important to discuss these substances as the leading public health issue in adolescents because they are the first group of substances that serve as gateway substances to more dangerous and addictive substances.

A 2014 report from the surgeon general, The Health Consequences of Smoking—50 Years of Progress: A report of the Surgeon General, 2014, stated that tobacco use continues to be the leading preventable cause of disease and death in the United States, and "particularly cigarette smoking, imposes substantial health and financial costs on our nation" (Office of the Surgeon General, 2014, p. 2). In almost all cultures, adolescents most widely begin experimenting with prohibited substances with tobacco use. According to the latest NSDUH survey, 4.2% of adolescents aged 12 to 17 smoked cigarettes in the past month in 2015. This represents approximately 1 million were current cigarette smokers (SAMHSA, 2016).

According to the latest National Youth Tobacco Survey, 22.9% of high school students surveyed in 2013 were current users of tobacco products (Arrazola et al., 2014). This represents a stabilizing trend over the past decade. A deceptive part of this fact is that a negative trend may be buried in such numbers. Researchers have noted that a deeper analysis shows that uses of multiple types of tobacco products are increasing (Arrazola et al., 2014). These findings, in combination, indicate that continued diligence in scrutinizing the data and increased efforts are needed to monitor and so that prevention professionals continue to send messages to prevent the use of all forms of tobacco use among youths.

Data From Major National Surveys

According to the latest NSDUH, 8.8%of youths aged 12 to 17 were current illicit drug users of heroin, hallucinogens, inhalants, and prescription-type psychotherapeutics (pain relievers, tranquilizers, stimulants, and sedatives; as cited in SAMHSA, 2016). This has translated to approximately 2.2 million adolescents who report currently using illicit drugs. Breaking down illicit drug use, marijuana was found to be the most commonly used illicit drug. NSDUH reported that 7.0% of adolescents aged 12 to 17 reported current-use in 2015 (as cited in SAMHSA, 2016).

The MTF survey study also collects similar data. While NSDUH, a household survey, collects data according to age groups, MTF gathers substance use and behavioral health data by grade levels since they survey students who are in eighth through 12th grades. The findings from MTF surveys reported that uses most of illicit drugs have

remained stable over the past few years (Johnston, O'Malley, Bachman, & Schulenberg, 2016).

The Youth Risk Behavior Surveillance System (YRBSS) is another large national survey system that collects data from similar sampling frames. The population of interest for YRBSS is a school-based national, state, and large urban school district (Centers for Disease Control and Prevention (CDC), 2016). YRBSS conducts representative samples of students in Grades 9 to12, representing a slightly different sample from that of MTF. Some of the results from the latest national YRBSS include the following: In 2013, 15.7% of students reported current cigarette use (had smoked cigarettes on at least 1 day during the 30 days before the survey), 34.9% of students reported current alcohol use (had had at least one drink of alcohol on at least 1 day during the 30 days before the survey), and 23.4% of students reported current marijuana (had used marijuana one or more times during the 30 days before the survey; Kann et al., 2014).

Another set of national surveys that requires a mention here is the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) conducted by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (NIAAA, 2006). NESARC is unique in that it is one of the largest and most detailed survey systems to date. One of the reasons for its uniqueness is its large sample size (NIAAA, 2006). Sample size is important because the larger the sample size, the more accurate the findings, which makes it possible to achieve more stable estimates of even rare conditions (Gerstman, 2008). The original NESARC was conducted in 2001 and 2002, the second NESARC was conducted from 2004 to 2005, and NESARC III was fielded in 2011

(Hasin & Grant, 2015). The results from the survey system provide detailed and comprehensive dataset related to alcohol and a range of comorbid disorders (Saha, Chou, & Grant, 2006). NESARC's uniqueness is also one of the reason it was not references extensively here since it concentrates only on alcohol and its related conditions and its survey time frames do not match with other three survey systems.

These data sets presented here report on measures on similar behavioral issues. Even though these three major surveys on young people have different sampling frames and different methods of surveys, messages from all three surveys are poignant and meaningful since the sum of these data sources contribute to a broader understanding of substance use from different perspectives and the relationships of substance use to other behavioral and social issues. It should be noted that they make similar observations on risky health behaviors in young people as their data are remarkably congruent. The fact that all three major surveys of young people have concluded that substance use by youth is a major public health problem indicates that these problems will mostly likely intensify if we do not seek to find public health solutions such as evidence-based prevention programs that are available for implementation, targeting populations starting at early stages of lives.

The common threads through all of these data are that abuse of alcohol and other substances are unacceptably high and are interwoven with other observations on risky behavioral problems. The results of these studies indicate a need for continued monitoring of health-risk behaviors and the prevention of these risk taking behaviors among youths. The problems are diverse and causes are multifaceted. However, many

of these realities indicate that these are related behavioral problems, finding ways to prevent one risky behavior can lead to improving the overall behavioral health of the population, and education of children at earlier ages is a key to success.

Alcohol Use During Adolescence

Alcohol is often the first substance that adolescents begin to misuse, and it is the primary contributor to the leading causes of death among adolescents (CDC, 2015). According to the latest NSDUH survey in 2015, 9.6% of adolescents aged 12 to 17 reported drinking alcohols during 30 days prior to the survey (SAMHSA, 2016). This represents approximately 2.4 million current alcohol using adolescents. 5.8% of respondents aged 12 to 17 reported binge drinking in 2015 (SAMHSA, 2016). This shows that about 1.4 million adolescents were binge drinkers in 2015 (SAMHSA, 2016). Binge drinking is commonly defined as having five or more drinks on the same occasion on at least 1 day in the 30 days prior to the survey (Abbey, Pilgrim, Hendrickson, & Buresh, 2000).

A study of underage drinkers, defined here as 12 to 20 years old, revealed that 60.6% of underage drinkers were binge drinkers (SAMHSA, 2016). Approximately a quarter of binge drinkers (24.9%) were heavy drinkers (SAMHSA, 2016). Heavy drinkers are defined as those who engaged in binge drinking on 5 or more days in the past 30 days. Also, as expected, the rates of underage alcohol use increased with age. While almost 10%of adolescents 12 to 17 years old were current drinkers, fully 58.3% of adolescents aged 18 to 25 reported current drinking in 2015 (SAMHSA, 2016).

Importance of Influence of Environment on Adolescent Behavior

A review of the literature on adolescent behavior further emphasizes the importance of the environment where children learn and grow and the critical need for prevention efforts focusing on adolescents and their environments. According to a NSDUH report, more than half of those adolescents who drank alcohol reported that they used alcohol in someone else's home, and 31.4% reported that they drank alcohol in their own home (as cited in SAMHSA, 2013). The fact that drinking by adolescents occurred at homes means that alcohol was supplied by someone older in these households. SAMHSA (2012) further reported that 72% of underage drinkers did not have to pay for their alcohol, and 28% paid for the alcohol the last time they drank. Fully 7.6% of those reported that they were able to purchase their drinks themselves, and about 20% reported that they were able to pay someone to buy their drinks. About 37% of those who did not pay for their drinks got them from unrelated adults, 23% got them from a parent, guardian, or other adult family member, and about 19% got them from their peers (SAMHSA, 2012).

Environmental, cultural, and social implications of underage alcohol consumption have many consequences and have huge implications in many related areas. Alcohol-related accidents are the leading causes of death among adolescents (CDC, 2015). The landmark publication from the surgeon general, "Call to Action" (2007) cited that "persons who begin drinking before age 15 are more likely than those who start at 21 years or older to those do not drink". Many researchers link early age of onset of alcohol

use to development of more sever substance- related problems (Guttmannova, et al. (2011); (Hingson, Heeren, & Winter, 2006).

The *Call to Action* also linked underage drinking onset with "risky sexual behavior, car crash involvement, unintentional injuries, and physical fights after drinking in both adolescence and adulthood" (OTSG, 2007). Other reports also associated underage drinking to "suicidal behavior, dating violence victimization and perpetration" (Swahn, et al. (2008); "prescription drug misuse; injuring oneself and others after drinking as adults" (Hingson & Zha, 2009a); and "younger drug use onset, drug abuse, and dependence, which predict driving and motor vehicle crash involvement after drug use" (Hingson & Zha, 2009b).

Risk Factors Contributing to Behaviors in Adolescents

Neurological and Psychological Development During Adolescence

The adolescent period is the time of life from approximately 12 years of age to 17 years of age, a period of growth and change, a transition from childhood to adulthood (MacKay & Duran, 2007). It is a period in which adolescents experiment with new opportunities to engage in risky behaviors such as initiations of uses of alcohol and other substances. For example, adolescents are more likely to be engaging in binge drink, smoke cigarettes, have casual sex partners more than older individuals. Experts sometimes attribute these behaviors as sporadic and opportunistic in nature, in another words, they do them because opportunities presented themselves (Chein, Albert, O'Brien, Uckert & Steinberg, 2011). They may also engage in more impulsive or violent criminal

behavior such as risky driving or driving under the influence of alcohol (Steinberg, et al., 2008).

Decision-making in real life in regards to risky situations during adolescence is a subject of intense neuropsychological research. There are many studies (Casey, Getz & Galvan, 2008; Luna, Padmanabhan & O'Hearn, 2010; Somerville, Jones & Casey, 2010; Steinberg, 2008; Van Leijenhorst, et al., 2010) that reported such risky behavior during adolescence reflects the complicated combination of various neurological functions that affect decision-making. Research findings on understanding of the etiology of mechanism of influence on teenager to exhibit behavior that ends in compromising of one's wellbeing can add to information to assist in developing strategies for intervening to prevent or reduce behavior with negative consequences (Chein, Albert, O'Brien, Uckert, & Steinberg, 2011).

Latest scientific developments in neurological investigations into developing brains revealed a wide variety of surprising findings that attempts to explain adolescent behaviors in physiological terms. Some recent advances in brain mapping reveal that young teenager's brain look different from that of adult (Gogtay, et al., 2004; Smith, Chein, & Steinberg, 2013). It is, therefore, plausible to suggest that biology has much to contribute to understanding of risk-taking behaviors in adolescents in addition to what we know about cultural norms and of peer pressure.

Scientists have studied teen brains using advanced tools such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) and found that teenagers' prefrontal cortex, the part of the brain usually associated with "social

appropriateness" enables assessment of social and ethical situations, make sound decisions are under development. In another words, ability to keep emotions and desires under control are rapidly changing in these developing brains (Scherf, Behrmann, & Dahl, 2012). Understanding how these structural changes translate into behavioral changes will help researchers connect the dots to why adolescence may be a period of vulnerability in brain development.

Although taking drugs at any age can lead to addiction, scientific research show that the earlier onset of drug use will more likely to progress to more serious abuse at later life (Smith, Chein, & Steinberg, 2013). The most likely conclusion from such findings is that drug use during early developmental phase will surely have more lasting harmful effect and that early exposure is a strong predictive indicator of anti-social and behavioral problems.

Risks of problem behaviors increase greatly during times of transition. Development of decision-making skills during adolescent phase may fluctuate or limit their ability to accurately assess cost versus benefits, risks versus opportunities and make sound decisions in situations such as drinking and driving and other risky taking ventures. Since drug and alcohol abuse can disrupt brain function in behavior control, understanding such connections between neurobiology and behavioral science can suggest how it could lead to prevention of risky behaviors and intervention strategies that are more effective in promoting recovery.

Cultural Norms and Peer Pressure

Cultural attitudes toward alcohol and other drugs (AOD) have influenced human behavior throughout history. Cultural norms, sometimes referred to as "the way we do things around here", are very likely the most important set of behavior patterns surrounding substance use developed over many generations. Cultural norms are defined as behavior patterns that are typical of specific population groups that take place in the context of their own organizational culture (https://www.reference.com/world-view/culture-norm-6943133b2413a542). They are social standards of appropriate behavior of specific populations and they may or may not coincide with laws and official policies of larger society (Allen, 2006, p.1).

While some of these behavior patterns are healthy, some are harmful to individuals in the population. As true in any other commonly held belief systems, some cultural norms contribute to positive characters of populations and communities, while others are simply harmful and do not make positive contributions to their respective communities. While there are many reasons for existence of cultural norms, they are often so ingrained into an individual's daily life that individuals may not be aware of harmfulness of their behaviors. In fact, they may have difficulty in discerning such consequences from behaviors resulting from them let alone recognizing and changing them. This may not happen until these behaviors are contrasted with other cultures with context of different values and beliefs (Pasick, 1997)

In many cultures, drinking in one's home is not unusual and is common with young age, and some research has found that many believe that there is nothing wrong or

unhealthy about allowing young people to consume alcohol (Newes-Adeyi, Chen, Williams, & Faden, 2005). However, according to the surgeon general of the United States, his "Call to Action to Prevent and Reduce Underage Drinking" in 2007, "underage alcohol consumption in the United States is a widespread and persistent public health and safety problem that creates serious personal, social, and economic consequences for adolescents, their families, communities, and the Nation as a whole." (Office of the Surgeon General, 2007, p.1) The impetus for such statement is the large amount of scientific research showing the negative consequences of underage drinking on development of young bodies and minds (Giedd, 2004). The Monitoring the Future (MTF) survey reported that, by the time children are in 8th grade, a third of them have already tried alcohol and 70% of them by the time they reach 12th grade (Johnston, O'Malley, Bachman, & Schulenberg, 2011).

Another aspect of importance of cultural norms is that of peer pressure. A recent study by Gilman and associates (2014) indicate that adolescents who associate with prudent peers are more likely to engage in positive behavior. In contrast, those who hang out with those who engage in imprudent behavior are more likely to engage in behaviors with negative consequences themselves (Gilman, Curran, Calderon, Stoeckel, & Evins, 2014). Adolescent alcohol use, cigarette smoking, substance misuse, and antisocial behavior, are all behaviors that are strongly associated with peer pressure. Prudent and positive social peer behaviors are predictive of such behavior as alcohol abstinence and prosocial behavior.

Honest discussions on harmful effects of underage drinking are especially important in times of changing mores and changing laws, often blurring the lines between healthy behaviors and rights to practice unhealthy habits. Much of currently available information indicates that adverse consequences are much more pronounced in adolescent physiology regarding use of some illicit substances. For example, "the highest prevalence of drug dependence in the U.S. population is among 18 to 20 years old who typically began using years earlier" (Grant, Stinson, Dawson, Chou, Dufour, Compton, et al., 2004). This finding underscores the need to consider developmental aspect of behavioral progression, especially in light of the fact that early initiation to drinking has shown to lead to increased negative consequences such as alcohol-related accidents (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002).

In order to bring about positive changes to underage drinking, the shift in cultural norms needs to occur (Allen, 2006). For such shifts to occur, the public must be educated so that they are convinced that alcohol and other substances do cause harm especially in young people (Newes-Adeyi, Chen, Williams, & Faden, 2005). They must be convinced that alcohol and other substances have one thing in common in that they are psychoactive substances.

Psychoactive substances or psychotropic drugs are chemical substances that affect functions of the central nervous system "resulting in alterations in perception, mood, consciousness, cognition and behavior" (Lowinson, Ruiz, Millman & Lingcod, 2005). Examples of uses of psychoactive substances that are accepted by some cultures around the globe include peyotes, khat leaves, cocoa leaves, etc.

Peyotes are a class of cacti known for its psychoactive properties by Indians. Peyotes have a long history of ritual uses by some Native American tribes and used as a recreational drug because it can cause hallucinations (Bruhn and Holmstedt, 1973). It contains chemicals that have effects that are similar to LSD and carry serious health implications. Chewing of khat leaves has had a history as a social customs in parts of Africa and Asia dating back thousands of years. Khat contains an amphetamine-like stimulant and World Health Organization classified it as a drug that can be abused (Nutt, King, Saulsbury, Blakemore, & Colin, 2007). Coca leaf chewing is a very common activity among people from various South American cultures. It is the source of cocaine and are consumed to relieve hunger and fatigue and to enhance physical performance despite known negative consequences (Plowman, 1979).

Ambiguousness around the issues of whether certain cultural norms are risk factors or protective factors, and what norms are acceptable and what are not, provided the basis for much debate in the fields of substance abuse prevention programs as to what represents best practice (Office of Juvenile Justice and Delinquency Prevention, 2005; SAMHSA, 2004). One of the major goals of substance abuse prevention programs, therefore, must be understand importance of cultural norms in directing prevention efforts to include cultural competence, thereby bring about positive changes.

Alcohol Use and Its Link to Behavioral Patterns in Adolescents

Alcohol as a "gateway" to riskier behavior. Alcohol is the drug of choice among adolescents and is used by young people more than tobacco (Johnston et al, 2006). Alcohol has been implicated as a "gateway drug" that will lead nascent users to try other

behaviors that may, in turn, lead to seek substance that may provide stronger effects. Researchers have been studying whether these "gateway substances" will inevitably lead youth down the path to "harder" drugs and harmful behaviors (Pasick, D'Onofrio, & Otero-Sabogal, 1996, p.S142).

Several studies observed links between alcohol misuse and other high risk behaviors during adolescence (Miller, Naimi, Brewer, & Jones, 2007; Hingson, Heeren, & Winter, 2006; Ellickson, Tucker & Klein, 2003; Fergusson and Lynskey, 1996). Those who initiate drinking alcohol early and those who experimented with risky behaviors were found to be more likely to be linked to academic problems, substance abuse, and delinquent behavior later in their lives (Ellickson, Tucker & Klein, 2003). A classic study by Fergusson and Lynskey reported on extent to which correlations between early initiation of alcohol use and risky sexual behaviors during adolescence could be associated with common risk factors that predisposed individuals to both outcomes. The study conducted over 16 years reported that children who misused alcohol at early ages were 6 to 23 times more likely to have initiated sexual intercourse before age sixteen, have multiple sexual partners, and engage in unprotected intercourse than those that did not engage in underage drinking (Fergusson & Lynskey, 1996).

Myers demonstrated a clear association substance misusing adolescents progressing towards harder drugs later in life by showing that these youths were much more likely to use cocaine later in life than those children who did not use any of the "gateway drugs" (Myers, 2004). Myers also demonstrated that those adolescent who consume more alcohol were more likely to have also tried marijuana (Myers, 2004). This

and other studies mentioned previously (Pasick, D'Onofrio, & Otero-Sabogal, 1996, p.S142) support the concept that progression from what may appear to be benign "gateway" behaviors can lead to more consequential and riskier behaviors.

Low self-esteem. A commonly held belief of health professionals during early phases of work with behaviors of adolescents during 1980s was that there were high correlations between drug use and lower self-esteem (Dielman, Campanelli, Shope, & Butchart, 1987; Young, Werch, & Bakema, 1989). Recent studies by sociologists reinforce such beliefs. Researchers at Florida State University reported that adversity resulting in low self-esteem has a direct relationship to uses of alcohol and other drugs because those with low self-worth would be particularly attracted to illicit substances (Lloyd & Turner, 2008). This is perhaps the reason for a large numbers of substance misuse prevention and treatment efforts have been directed at enhancing the self-esteem of youth.

Importance of family involvement. Studies have also shown the importance of parental involvements in determining behaviors of adolescents. Alfred Adler advanced a theory known as the "Adlerian Parenting Theory" in early 1900s. This theory has particularly been influential in advocating for parental involvement in childhood development. It advocates for special consideration of a family constellation including mutual respect among family members and parental leadership to guide positive behavioral development in children (Abbey, Pilgrim, Hendrickson, & Buresh, 2000).

Murray Bowen (1974) advanced a similar theory on importance of family involvement in the "Family Systems Theory" that point to critical importance of family

as most foundational emotional unit. The theory has been embraced by prevention practitioners with aims to increase parental communication and disciplinary skills (Garthe, Sullivan, and Kliewer, 2015; Segal, Chen, Gordon, Kacir, & Gylys, 2003). Accordingly, many prevention efforts have been directed at enhancing family interactions, especially between parents and their young children.

As described through this review of the literature, base of knowledge on substance misuse prevention over past three decades shows that the research and theory related to prevention programs have been diverse and not always been systematic. Systematic approaches to research necessarily involve series of studies that the research community and practice community are able to replicate results in systematic ways so similar conclusions from similar environments are derived (Engbers, van Poppel, Chin, & van Mechelen, 2005). Systematic review necessarily must involve a system of rating of existence of evidence based on standardized scientific evaluation. Such rating system must consider reproducibility of process and soundness of claims of best-evidence to eventually determine utility in planning for effective interventions (Eden, Levit, Berg, & Morton, 2011).

Conceptual Frameworks

Conceptual frameworks are "the way ideas are organized to achieve a research project's purpose" (Shields, & Rangarjan, 2013, p24). They are particularly useful as a tool to organize empirical evidence from research and it is important to discuss variety of foundational knowledge bases that are necessary in understanding the proposed research project.

Behavioral Context Using Social Ecological Model

The social ecological model (SEM) is organized to understand hierarchy of behavior and develop interventions to produce desired outcomes in changing behavior based on that hierarchy (Blum, McNeely, & Nonnemaker, 2002). The model is used to identify risk and protective factors from biological, psychological, social, cultural and environmental perspectives. It ensures consideration of multiple components when designing interventions that desires to bring about comprehensive solutions to problems that span across multiple domains (Blum, McNeely, & Nonnemaker, 2002; Krug, Dahlberg, Mercy, Zwi & Lozano, 2002; McLeroy, Steckler, & Bibeau, 1988).

The domains in the SEM are hierarchal from the most basic individual level and ultimately to societal level. Descriptions of each level of domains are summarized below by the way of paraphrasing descriptions from other published sources on SEM domains (Blum, McNeely, & Nonnemaker, 2002; Krug, Dahlberg, Mercy, Zwi & Lozano, 2002; McLeroy, Steckler, & Bibeau, 1988).

The individual level domain. It is the first level of the SEM and it identifies most basic and foundational one. Personal level data including biological and individual personal factors are considered in assessing the likelihood of child abuse or neglect. Some of these factors may be age, gender, ethnicity, and family background. Personal belief system, cultural norms including substance misuse habits are also important factors. Prevention strategies at this level focus on promoting changes in attitudes and, beliefs that influence abusive behaviors at individual level (Blum, McNeely, & Nonnemaker, 2002).

Relationship level domain. This is the second level that examines relationships in an individual's close social circles such as family and friends. Prevention strategies at this level may include promoting changes in family dynamics and peer strengthening (Blum, McNeely, & Nonnemaker, 2002). *Community level domain* explores schools, neighborhood and workplace dynamics that influence individuals and their peers through social relationships (Blum, McNeely & Nonnemaker, 2002). *Institutional level domain deals with* roles that institutions play in prevention. Strategies that focus on changes of policies and laws at local levels are most appropriate for this domain. (Blum, McNeely & Nonnemaker, 2002).

Societal level domain. This is the ultimate level that looks at the large pictures of broad societal factors such as cultural norms that help determine behaviors of individuals within the society. Examples of societal strategies include environmental strategies that reach large populations such as mass media campaigns designed to shift societal norms (Blum, McNeely, & Nonnemaker, 2002).

One of the main objectives of substance abuse prevention programs that target adolescents are to understand and change cultural norms to bring about positive behaviors, thereby reducing alcohol, tobacco, and illicit drug use. Selected articles relating to knowledge on these cultural behavior patterns and risky behaviors in adolescent persons are reviewed here. The cumulative knowledge gained from research on risk and protective factors are the basic foundation on which many programs to reduce substance abuse are developed.

Social Development Model

The basic foundation theories on adolescent behavior central to the SPF process can be said to derive from the social development model (SDM). Researchers at Social Development Research Group (SDRG) were the first to develop the SDM (Hawkins, Catalano, & Miller, 1992). The group headed by Hawkins and Catalano suggested that most effective strategies for influencing adolescent behaviors are through identification of their risk and protective factors. Strategies to prevent adolescent risky behaviors in youths are most effective when programs are planned with appropriate risk factors in mind (Resnick, Bearman, & Blum, 1997).

The group also showed that individual characteristics and influences from family and friends, as described in the SEM (Blum, McNeely, & Nonnemaker, 2002) are important in determining health behaviors and factors contributing to them during adolescent period (Kosterman, Hawkins, Guo, Catalano & Abbott, 2000). Scientists at SDRG, using the SDM examined the risk factors that predict early onset of alcohol and marijuana use. They showed that risk factors that influence early initiation influences the behaviors of individuals across the life span. Furthermore, the same risk factors at individual levels were effectively influenced at behaviors of peers at higher levels. From this conclusion, they stress the important role of parental and peer guidance in delaying initiation of risky behaviors (Kosterman, Hawkins, Guo, Catalano & Abbott (2000).

Catalano, Berglund, Ryan, Longczak, & Hawkins (2004) further explain why prevention strategies must shift from a single problem focus to a multi-faceted approach since many behavioral problems share common risk factors and protective factors. The

findings by these and other researchers (Lloyd & Turner, 2008; Kosterman, Hawkins, Guo, Catalano & Abbott, 2000) point to multi factorial causation leading to multiple related risk behaviors that will require multiple pronged prevention strategies. Therefore, communities that desire to promote healthy behaviors and to prevent risky adolescent behaviors must begin with assessment of existing factors that influence its environment by monitoring the risk and protective factors that influence their children. The Social Development Model explains and connects many aspects of evolution of risky behaviors and substance abuse in adolescents. This theoretical framework was thus utilized as the foundation to develop the Strategic Prevention Framework.

Evidence-Based Prevention Programs

Much of discussions in the field of prevention revolve around what constitutes evidence-based programs. Some preventionists question the need to promote the uses of evidence-based programs when implementing prevention programs (Kellam and Langvine, 2003). However, to the extent that understanding of risk and protective factors is built into how researchers report their findings to assist communities to make decisions and support programs working to prevent youth problems, there are needs to make the information available to practitioners in such manners to guide them to plan evidence based programs.

Sheppard Kellam, of "Good Behavior Game" fame, (Poduska, Kellam, Wang, Brown, Ialongo et al., 2008), described a guiding principles for determining the basis for best evidence. The guidance begins with "a multidimensional framework for understanding the meaning of evidence in prevention science" (Kellam & Langvine,

2003). Sharing of the vision and purpose of prevention by those who practice in the field clearly defines "qualities and rules of evidence". The concept of "evidence base" can be easily implemented once these qualities and rules are commonly understood and accepted. Once the concept is implemented widely, quality of prevention research and programs would improve. Anderson, Brownson, Fullilove, Teutsch, et al. (2005) wrote, once the limits and constraints of "best evidence" for public health were understood, "we can take full advantage of our scientific knowledge base while also recognizing the contribution of the many factors relevant to sound policy and practice decisions".

NREPP Registered Evidence-Based Programs

The National Registry of Evidence-Based Programs and Practices (NREPP) is a federal registry that aims to provide communities and their coalitions to developers of mental health and substance abuse intervention programs so they can utilize the information to adopt them to plan and implement programs in their own communities. A search of the NREPP database revealed over 300 mental health and substance abuse intervention programs were listed, categorized, described, and evaluated by review of studies made on these interventions (NREPP, 2014). The NREPP database (http://nrepp.samhsa.gov/AdvancedSearch.aspx) was searched using stepwise hierarchal search word going from more general and inclusive to more specific. Of 333 mental health and substance abuse intervention programs listed, 208 interventions were substance abuse related programs. Of these, 64 interventions were replicated substance abuse prevention programs, 46 Interventions were evaluated in comparative effectiveness

research studies, and 39 interventions included adolescents (13-17), and, of these, 13 were community based programs.

Of 13 community-based substance abuse prevention programs that included adolescents as program participants, only a handful of these programs can be truly classified as population-based and culturally sensitive prevention models that have been evaluated with scientific rigor (Park, 2014). Examination of all eligible entries in NREPP, only 7 of the registered programs were considered to be evidence-based substance abuse prevention focused on adolescents in community settings indicates the need for development and continued rigorous evaluations of programs that are available at community levels.

There are several factors that are common across all of these seven programs that fit the descriptors of evidence-based community-based substance abuse prevention programs focused on adolescents. According to the NREPP evaluators, qualities of research behind these programs were consistently high. Furthermore, the programs were replicated on multiple occasions and results of these replications were reported in peer reviewed journal articles. However, there is an unmistakable drawback to all of these programs that they all tended to be quite costly and their implementations required certification by the developers of the programs. One of the critical characteristic of programs that can be made available to communities is affordability and the cost of these programs is a negative factor.

The ability to reliably replicate results of study findings is essential component of scientific research and this holds true for prevention science also. The field of prevention

science is better positioned to help improve behavioral health if systematic replications are conducted with full knowledge of the trials that have preceded them (Valentine, Biglan, Boruch, Castro, Collins, Flay, et al., 2011). Evaluators at NREPP attempt to do this by creating a centralized repository of such boy of evidence and systematic reviews.

Studies prevention research to this point have largely focused on identifying precursors and predictors of adolescents' drinking and drug use (Gottfredson & Wilson, 2003; Kosterman, et al., 2000; Hawkins, Catalano, & Miller, 1994). There is a need for an approach to develop affordable, data-driven, evidenced based system of prevention strategies for community-based providers to plan and implement effective substance abuse prevention programs. Accordingly, there is also a need to systematically evaluate the effectiveness of these systems. This proposed study addresses this by focusing on one such operating system called the Strategic Prevention Framework.

The Strategic Prevention Framework

The Strategic Prevention Framework (SPF) is a culmination of lessons learned from a variety of previous evidence-based models that were developed over past decade prior to its launch (Imm, Chinman, Wandersman, Rosenbloom, Guckenburg, & Leis, 2007). SPF is an operating system developed by the Center for Substance Abuse Prevention (CSAP) of the Substance Abuse and Mental Health Services Administration (SAMHSA). It is a public health approach to provide guidance to states and their communities working together in assisting the delivery of effective prevention programs, policies and practices. The framework is also affordable since it is offered free to states and communities through a federal health agency and supported by organizations that

offer free technical assistance to those who agree to participate on assessment of their implementations.

As mentioned previously, the major focus of substance abuse prevention programs over past three decades were "single-component approaches focused on individual-level behavioral change" (Piper, Stein-Seroussi, Flewelling, Orwin, & Buchanan, 2012). However, such focus has transformed to multi-component strategies more broadly applied to both individual and environmental changes. The emphasis on environmental strategies naturally transitioned from individuals to multiple strategies that are directed at communities and local coalitions. This transition naturally encompasses the importance of collaboration between states and communities; and partnership among participating community coalitions and organizations (CSAP, 2002; Mitchell, Florin, & Stevenson, 2002).

Another unique feature of SPF is its evidence-based approach and emphasis on data driven decision-making process. Using the Social Development Model (Hawkins, Catalano, & Miller, 1992) as its stepping point, SPF emphasizes uses of sound theoretical frameworks and data to systematically assess the nature of substance related problems and risk and protective factors that contribute to them. The SPF program also emphasizes development of infrastructure and capacity to bring together resources and to develop coalitions to deal with the identified problems.

Moving SPF from SAMHSA's vision to operationalize to processes and practices are evolutionary in nature and involved strategic processes that states and communities undertook in partnership over an extended period of time. This has been a concerted

effort where the federal government provided the framework, technical expertise, and framework for monitoring and evaluation and states and jurisdictions provide the coordination, technical support and monitoring of communities. Communities and states implement the five steps of the framework together.

Five Steps of the Strategic Prevention Framework

The descriptions of five steps listed below are paraphrased from the SAMHSA documents that encourage states and communities to build on existing infrastructure/activity, where appropriate (SAMHSA, 2004). The figure 2 below is a result of collaborative efforts of the national cross-site evaluation team members to describe the SPF to depict graphically the nature of the framework (CSAP, 2013).

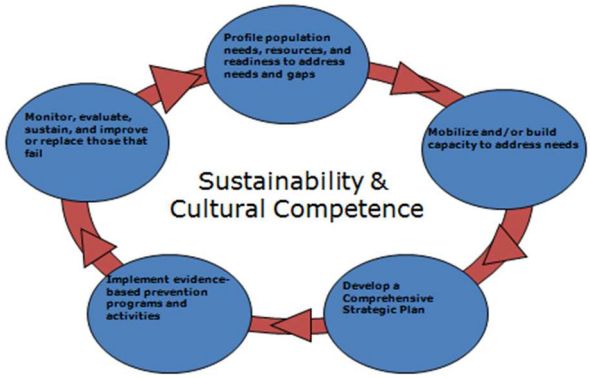

Figure 2. Graphic representation of five steps of SPF.

Assessment. The first step of the SPF process is that of initial needs assessment at state and community levels through collection and analysis of epidemiological data. That includes development of population profiles, assessment of the magnitude of issues in behavioral health in their communities; assessment of needs through identification of factors that contribute to these problems. The assessment step also includes assessment

of community assets and resources. From such assessment, communities are able to identify gaps between their needs versus capacity to serve these needs.

This data-based needs assessment is a primary requirement of the framework that set this system apart from all previous federal prevention programs. Another distinguishing aspect is its reliance on population-based data in contrast to the more traditional reliance on program level efforts of individual clients. It leads to systematic identification of priorities (CADCA, 2006a; SAMHSA, 2004).

Capacity. The second step involves mobilizing and building capacity to address needs, and engagement of key stakeholders at the State and community levels. Early involvement of stakeholders in planning and implementation of any program are critical for successful activities that will be sustained over time. CSAP and associated organizations provide ample resources to convene gathering of leaders and stakeholders and building coalitions because CSAP recognizes importance of organizing agency networks and leveraging resources (CADCA, 2006b; SAMHSA, 2014).

Planning. The strategic planning process is the third step that builds on first two steps to set measurable objectives and performance measures. States and communities develop comprehensive strategies for organizing and implementing prevention efforts using the logic models based on data driven needs assessment and building of community capacity (CADCA, 2007a; SAMHSA, 2004). The logic model should link the perceived problem with factors that contribute to the problems and desired outcomes after implementing the plan.

It is important to note that the steps involved in SPF are continuous, in that, a component step may be adjusted as the result of ongoing evaluation and monitoring activities throughout the five step process. The issue of sustainability and cultural competence should be constant throughout all of the steps to create long-term strategies that fit the needs of the communities they serve (CADCA, 2007b; CADCA, 2007c); (SAMHSA, 2004).

Implementation. The fourth step culminates in implementation of data-driven plans laid out by stakeholders. The strategic plans should be a comprehensive guide that assists in selection and implementation of policies, programs and practices that fit the needs and capacity of the communities. The framework requires that communities select evidence-based prevention programs. To assist in selection of evidence-based programs, SAMHSA provides an inventory of programs that were evaluated by the National Registry of Effective Prevention Programs (NREPP) (CADCA, 2007d; SAMHSA, 2014)

Evaluation. The fifth step rounds out the process. This is a part of program monitoring through ongoing evaluation. The step is essential to determine if the implemented program is working as planned. Even though this is placed as the last step of the process, the on-going monitoring process enables evaluators to suggest adjustments as required (CADCA, 2007e; SAMHSA, 2004). Evaluation and monitoring take many forms and it is important to note that this evaluation is in addition to program monitoring performed as a part of "grant monitoring" often associated with government grants. In CSAP, grantees periodically review the performance data and assess their progress in the form of quarterly Monitoring and Reporting Tool (MRT) and use this information to

improve management of their grant projects (CSAP, 2004). Submission of MRTs are designed to help determine whether programs are achieving the goals, objectives and outcomes intended and whether adjustments need to be made to the program (CSAP, 2004).

The evaluation step of SPF goes beyond individual program assessment by requiring systemic view of process and outcomes across the spectrum. Such systematic assessments provide broader perspective to determine whether programs are having the intended impact on behavioral health disparities being targeted (SAMHSA, 2013). The primary expectation of the officials who developed SPF are that states and communities that implement the framework are more likely to succeed in reducing uses of ATOD and other substance use related problems in their communities. The processes are designed to provide road maps for "successful comprehensive community plans to foster sustained long term change in communities in improving behavioral health all across America" (SAMHSA, 2014, p 4). CSAP developed and provided funding for the grant program called SPF State Incentive Grants (SIG) program to implement SPF at state and community levels in 2004. Although the grant program will continue for some time, the first two cohorts of the grant program finished their implementation in 2011 (Park, 2012).

This study aims to utilize portions of the data collected to assess the effectiveness of the program since enough data are accumulated and are available for analysis. The purpose of this study is two-fold; the first one is to determine the fidelity of the SPF program implementation and the second is to assess effectiveness of implementation of the SPF process.

Evaluation of Effectiveness of SPF

Evaluation of effectiveness of SPF is especially critical since many of the major existing operating systems link their programs to SPF (Flewelling, Hawkins, Spoth, Dutton, Johnson, Lloyd, & Park, 2016). Recent proliferation of lists of programs that purport to be evidence-based" (Park, 2014) requires increased scrutiny of these programs to be accountable for their claims. Interventions that have been researched, replicated, and are classified as being effective should be inventoried and be shared with communities. Therefore, there are demonstrated needs to develop standards and guidelines to assist policy makers and prevention practitioners to determine which interventions are effective.

A research group headed by Sheppard Kellam at John's Hopkins University reported on the development of standards to determine effectiveness of intervention that are ready for wide dissemination (Flay, et al., 2005). An intervention would be tested in at least two separate trials under the standard that "involved defined samples from defined populations; … used psychometrically sound measures and data collection procedures; … analyzed their data with rigorous statistical approaches;… showed consistent (positive) effects; (and) reported at least one significant long-term follow-up" (Flay, et al., 2005, pp 151-175).

Effective interventions scrutinized under these standards and have been evaluated under "real-world" conditions should be adopted and implemented with confidence that would ensure successful and sustainable prevention programs (Flay, et al., 2005, p. 151).

Therefore, researchers and prevention practitioners at community level must work together to develop effective and useful prevention approaches.

It is, therefore, imperative to leverage the science of standardization of evidence based programs and instill confidence among community coalitions to maximize scarce resources. Widely used prevention models are more likely to succeed if national partnerships with states and communities focus on such a model as SPF with five step framework to sustain effective and culturally sensitive prevention.

Summary

An exhaustive survey of literature in the field of evaluation of programs designed for prevention of substance abuse in adolescents has been attempted with this literature survey. Judging from the survey, this dissertation is likely the first systematic unbiased evaluations of the Strategic Prevention Framework, one of the premier operating system frameworks for substance abuse prevention specifically designed for young people at community level. This review of literature revealed that almost all previous studies published so far describe a specific inquiry or program that has been implemented in the field and very little attempted to investigate strategic frameworks by systematically comparing and contrasting communities that implemented the framework versus those that did not.

In conclusion, a review of literature reveals that there are various gaps and research on risky behaviors and risk factors that contribute to substance abuse in young people and in the knowledge behind strategies driving substance abuse prevention efforts.

This study contributes to addressing some of these gaps and to explore ways to ascertain effectiveness of such programs.

The following chapter describes the study methodology. Effectiveness of the SPF program will be assessed in communities within two states that have implemented the SPF and completed the pre- and post-implementation outcome data collections. The assessment will be done by using a multi-level, multi-method quasi-experimental design. The scope of the evaluation encompasses community level and interactions between these communities and their states. The evaluation design uses both qualitative data providing the data on implementation processes and quantitative data providing data on systems outcomes at the state and community levels.

Chapter 3: Research Method

Introduction

The effectiveness of the SPF is assessed in states that have completed the implementation of the program and have completed the collection of pre- and post-implementation outcomes data with the ultimate purpose of presenting SPF as a model framework for developing substance abuse prevention for adolescents at the state and community levels. The overall cross site evaluation of the framework was designed at the inception of the SPF SIG program funded by a federal agency as a multiyear, multi-cohort grant program to assist states and communities to implement SPF (CSAP, 2004).

The SPF SIG program began awarding a series of 5-year grants to state level jurisdictions to implement SPF in 2004, and CSAP has now awarded six cohorts of SPF SIG grantees and plans to end the program in 2017 (CSAP, 2014). Both process and outcomes data are collected from all five stages of the SPF process by the grantees and are deposited in a database at the ICPSR, a national repository of social science research data, to make the data available for analysis by evaluators and researchers who are interested in various aspects of evidence-based programs to prevent substance abuse and other behavioral problems.

The assessment is performed by a secondary examination of a portion of the data collected and deposited into ICPSR. Since the process and outcomes data collected were from state and community levels as the SPF programs were being implemented through the life cycle of the five-step programs, the evaluation of the programs employed a multi-level, multi-method quasi-experimental design. I used both qualitative and quantitative

approaches, the qualitative approach providing the data on infrastructure and implementation processes, and the quantitative approach providing outcomes data at the state and community levels.

Research Design and Approach

The study was designed to evaluate SPF as an operating system to assist in the development of substance abuse prevention programs. One of the purposes of the study was to evaluate the effectiveness of the framework so that such a framework may be offered as an exemplar to be offered to prevention professionals. The description of the study begins with the basic design of the national evaluation study and analysis of the data collected by the national evaluation group. The description of analysis then follows with descriptive analysis and inferential analysis using both qualitative and quantitative methods. A more detailed plan of the analyses follows with a description of the rationale behind each approach and the reasons for the choice of specific analytical approaches.

Evaluation Designs

Approaches to implementing the SPF model, including the selection of priorities and measurement of changes in proximal and distal outcomes, differed among states due to grantees receiving considerable latitude to address their particular needs using culturally appropriate, evidence-based prevention strategies. These differences shaped and constrained the study methods. States implemented the SPF in communities that were typically defined by geographic boundaries and ranged in size from small towns or reservations to entire counties. In the present study, I focused on changes in the funded

communities that targeted specific contributing factors identified in their implementation process. These are referred to as targeting communities.

The basic design of the national evaluation study is multilevel, quasi-experimental in nature since it is essentially an observational study of a program implemented across the nation, states, and communities. Since the program was implemented in an open environment and observations are made on systems changes and population outcomes, there is no random assignment of samples. The lack of random assignment naturally brings up a question on internal validity because the intervention groups and control groups may not be comparable, thus any observed results may not be directly attributed to the intervention studied. Since the internal validity is basically concerned with a causal relationship and this was an observational study, attribution of causality was not as critical as in an experimental study.

The ability to build relationships between observed changes to the effects of the SPF interventions was made by contrasting targeting communities with two types of nonintervention communities that were defined by their priorities in contributing factors and funding status. In some states, not all of the funded communities shared the same priorities. Unfunded communities and funded communities that did not target a specific contributing factor (non-targeting communities) comprised one type of comparison communities. Some states set up their own metric to match one or more unfunded communities to a particular funded community (matched communities). This second type of contrast tested the effect of a specific prioritization relative to unfunded but otherwise similar communities. Communities in both contrast groups shared a similar

state history and presumably experienced naturally occurring changes similar to the targeting communities, allowing such factors to be parsed out rather than be confused with the effect of the SPF SIG.

Due to the nature of the grant protocol, the collection of evaluation data lagged behind the actual length of each grant cycles. Even though the implementations of SPF by grantees in first two cohorts of SPF SIG were completed in September 2010, data collection protocol specified collection of two post-implementation outcomes data. The intervening variables and outcome data analyzed for this study include all data received by the evaluation team through November 2012. State evaluators, in addition, extracted some community-level measures directly from national data sources such as the Fatality Analysis Reporting System, the NSDUH, the (MTF Survey, the YRBS, and the Behavioral Risk Factor Survey System.

NSDUH is a SAMHSA sponsored survey system that is conducted annually and provides estimates of behavioral health indicators that include ATOD and nonmedical prescription drug use (SAMHSA, 2015). MTF is a NIDA sponsored annual survey of secondary school student behavior conducted by the University of Michigan (Johnston et al., 2016). The YRBS, conducted biennially by the CDC, surveys a wide variety of health risk behaviors that contribute to the health issues among adolescent youth and young adults, including ATOD use (CDC, 2014). The Behavioral Risk Factor Survey System is an annual health behavior survey system conducted by the CDC. It collects information on health risk behaviors, prevention practices, and health care access with a large sampling base that often allows analyses at community levels (CDC, 2015).

Use of a Mixed Method in This SPF SIG Evaluation Study

I made use of quantitative and qualitative approaches to evaluate both processes and outcomes data collected from states and communities. An examination of process data occurred at both state levels and community levels in order to describe and document the activities undertaken as part of the SPF SIGs (CSAP, 2004) and to support the evaluation of epidemiological outcomes (Sonnefeld et al., 1998). As mentioned as a part of explanation of the nature of this study, it was first necessary to evaluate implementation fidelity to answer whether the programs are implemented as intended. This avoided the attribution of failures or "lack of effects" to the actual program rather than a failure to implement properly or completely (Steckler, 1989).

The evaluation of processes through interviews also enabled an assessment of program fidelity. Process information provided whether and how the framework was used (Orwin, 2000; Orwin et al., 1998), thus facilitating segregating the effects of the five steps and identifying the effective elements of the program and policy (CSAP, 2004). The questions laid the foundation for the evaluation focus on impact, and each question addressed a different aspect of outcomes indicators as a result of the impact of SPF at the state and community levels. The evaluation design was also guided by the logic model of impact of SPF SIG as described in Chapter 2. The logic model helped graphically describe the logical links among the problems, contributing factors, and desired outcomes of the implementation of the framework and articulates a broader theory of impact.

Setting and Sample

Sources of Data and Related Information

A group of evaluators of the national cross site evaluation study team collected data from state level and community level programs that implemented SPF programs from 2004 through 2010. I collected outcomes data on target populations, the group at risk of abusing alcohol and other drugs. Although the SPF SIG program is still ongoing, there were enough data collected from states and their communities to evaluate the impact of SPF implementation examination of the data collected at baseline and at the completion of the program at the end of 2013 (CSAP, 2013). Communities that implement the SPF programs provided outcomes data to the national evaluation team on interventions they selected based on their needs assessment. These data were compared to a comparable national data collection system such as NSDUH for the purpose of evaluation of the SPF program (SAMHSA, 2013).

In this study, I used secondary data that were collected for a major national evaluation study described above. The majority of the data were mined from the data that were collected by a team of national researchers for the purpose of evaluation of the implementation of the SPF SIG program. The data that were collected were deposited into ICPSR archives (ICPSR, 2013). The final set of data deposited to ICPSR included the data from 26 jurisdictions that implemented the SPF program from 2004 through 2011 (Westat, 2013).

There are numerous rationales for the choice of this particular data set for this research project. By far, the most important reason was the richness of the data collected

over long periods of time. CSAP partnered with the NIDA to design a series of data collection instruments that aimed to ascertain the process of the implementation of SPF, a very comprehensive framework, an operating system (Park, 2013). This was coupled with the collection of outcomes data to complement the evaluation of the implementation of the program.

The data for the evaluation of the SPF program were compiled by a group of nationally recognized evaluation researchers using their expertise, time, and resources that enabled a collection of an array of extensive data sets not easily compiled by individual evaluation researchers. The large amounts of data were gathered and made available for researchers by depositing them to an ICPSR collection, a national warehouse on social research data. Making the data sets available for the widest possible distribution to the scientific world was one of the expressed wishes of CSAP and NIDA, the agencies that funded this data collection effort (CSAP & NIDA, 2004). Therefore, they attempted to ensure that these data are disseminated through as many different means as possible. Although the data sets that were deposited to ICPSR are in restricted formats because of concerns for confidentiality of the selected data sets, they are free for any member institutions and their researchers who may gain access to the data sets with minimal efforts.

National, state-level, and local-level epidemiological data serve as the basis of comparison to the data collected from states and communities that implemented the SPF. It should be noted that some of the additional community level outcomes data were

supplied to project officers at CSAP after the final set of data were deposited to ICPSR and those were forwarded to the CSAP data warehouse.

The SPF SIG program that began in 2004 is still in progress. As of this date, the program awarded six cohorts of jurisdictions that comprise of 50 states, the District of Columbia, eight territories, and 18 Native American tribal entities. In this particular research study, I focused only on first two cohorts of states and jurisdictions because they completed their implementation of the program, and enough longitudnal data have been accumulated to assess the effectiveness of the program.

Sampling: Inclusion Criteria

One of the primary questions of the evaluation study addresses whether states funded by the SPF SIG were successful in achieving positive changes in contributing factors among their funded (and targeting) communities. Only a subset of states voluntarily collected and provided intervening variable data. Intervention exposure dates, which varied between and in some cases within states, allowed for the identification of the appropriate data for analysis. To proceed, at least one pre-intervention data point and one post-intervention data point are necessary. An additional pre- and/or post-intervention observation is desirable to increase reliability and therefore strengthen inferences regarding the influence of the SPF SIG on intervening variables and outcomes. Thus, pre-exposure values represent the score (or the average of two scores) achieved during the period up to and including the intervention year. Similarly, post-exposure values represent the score (or average of two scores) that followed the intervention year.

Of the 26 states and territories funded in the first two cohorts of the SPF SIG, a majority of states met the criteria of providing both pre- and post-intervention community data for at least one indicator measure. Additional inclusion criteria have been established to contrast the change in contributing factors for targeting and control communities. At least nine states provided the data necessary to contrasts nominal improvement in targeting communities to improvements in comparison communities.

Sample Size Determination

Researchers rarely survey the entire population because the cost would normally be too high (Adèr, Mellenbergh, & Hand, 2008). Therefore, sampling would lower the cost with smaller resources. Sampling is a statistically supported process of selecting an unbiased portion of a population of interest. The data collection, if designed well, will approximate the entire population.

Statistical Power

Statistical power is defined as "the probability of rejecting the null hypothesis while the alternative hypothesis is true" (Cohen, 1992, p.68). Factors that affect statistical power include the sample size and range of the level of significance to accept for the study. In general, a larger sample size gives a study greater statistical power, but I had limited resources to collect a large sample and had to find a balance between the statistical difference and the scientifically acceptable difference. Therefore, it is important to note that a balanced approach was sought to seek a scientifically meaningful difference before doing a power analysis to determine the actual sample size needed.

The question asked in statistical power analysis is the following: How large must my sample be to ensure a reasonable likelihood of detecting a difference if it really exists in the population? High statistical power helps improve the chances that the findings are not just due to chance. The generally accepted value for power is .80 (80%). This means that it is necessary to show that, given the sample size, a real treatment effect (or mean difference) can be found 80% of the time.

There are three things that influence power in a study: Alpha level, effect size, and sample size (Trochim, 2006). Alpha level (Type I error) is the chance that there will be a significant treatment effect when one does not exist. When a larger value for alpha is chosen, the region of exclusion is expanded and the null hypothesis is rejected. In the absence of a strict requirement justification, by convention, .05 is used. This translates into a 5% chance that there will be a Type 1 error and the null hypothesis will be incorrectly rejected.

The other factors we have control over are effect size and sample size.

The standard definition of effect size is: $\frac{\text{Mean Difference}}{\text{Standard Deviation}}$

Thus, the effect size (which is a measure of how large the statistical difference is) is calculated as the difference between group means before and after intervention divided by the average standard deviation.

Cohen's *d* is a popular measure of effect size (Cohen, 1992). Its exact formula is based on

the t-statistic and it is calculated as: $d = \frac{M_1 - M_2}{SD}$

Cohen specified the following effect sizes:

Small: d<.50

Medium: d=.50 to .80

Large: d > .80

A review of literature in behavioral health assisted in determining the magnitude of effect sizes. Lipsey and Wilson (1993) provide effect sizes for a number of psychological, educational, and behavioral treatments.

Due to limited scope of this study, medium effect size is appropriate (Hallahan & Rosenthal, 1996). Using the table provided, it was determined that, at $\alpha = 0.5$, two tailed t test for two related samples for a minimum sample size of 26 was required for a medium size effect according to Cohen's d. Since the main focus of the study was underage alcohol abuse, enough number of states that would provide at least 26 communities would be selected out of nine states that satisfied all of criteria of inclusion at all levels of implementation.

Data Collection

Rationale for Approaches to Data Collection

The main questions addressed by this evaluation concern the SPF's overall effects on trends in state-level outcomes data and other epidemiological outcomes. Associated questions also attempts to identify approaches to the SPF that seem to be associated with greater changes in community level measures within the states that implemented SPF. Assessing progress in implementing the steps of the SPF and identifying variations among the States' processes of implementing the model are both necessary to identify the most successful approaches to SPF.

State Infrastructure Data Collection

The national evaluators collected state level data that are derived from interviews on state infrastructure. For each jurisdiction, two sets of interviews were conducted, the first one at the beginning of the program (R1) and the second one (R2) towards the end of the program (Orwin, Stein-Seroussi, Edwards, Landy, & Flewelling, 2014). Following each interview, interview teams coded responses using scales created for each domain. Final summaries were then shared with SPF SIG program directors for their concurrences and comments.

State Implementation Data Collection

An instrument was developed by the national evaluators for measuring how each of the steps in the SPF process was implemented. The implementation fidelity scores derived from the instruments can then compare pre-implementation values versus post-implementation values. That will be used in the cross-site analyses of state prevention infrastructure changes and epidemiological outcomes. According to the national cross site evaluation team, all 26 SPF SIG States participated in interviews assessing the implementation of the SPF (CSAP, 2013). These implementation interviews were conducted with the participation of SPF SIG program directors and other staff, such as project managers and evaluators, identified as knowledgeable about the interview topics. As was the case for state infrastructure interviews, two sets of interviews were conducted for each jurisdiction, the first one at the beginning of the program (R1) and the second one (R2) towards the end of the implementation of SPF. The coding system used by the interview teams were kept as standard as possible in line with infrastructure interviews

and final summaries were then shared as were the cases for infrastructure interviews (Orwin, Stein-Seroussi, Edwards, Landy, & Flewelling, 2014).

SPF Implementation Fidelity Assessment

One of the required conditions of SPF SIG grant award is that all funded jurisdictions and their selected communities were to implement the five steps of the SPF and state evaluators needed to address issues such as the extent to which the SPF was implemented as prescribed in the funded communities. In response to this need, cross-site evaluation team members and state evaluators created rating scales to help evaluators assess the quality of community-level implementation of the SPF steps and to generate data that were comparable across states.

Collection of Community Level Process Data

Similar to state level evaluations, the community level evaluations included infrastructure and implementation process measures. The infrastructure measures assess capacity of communities and coalitions to implement SPF and implementation measures assess process of SPF implementation. These measures include administrative organization, fiduciary resources, staffing, facilities, and other related to organizational context at hand (Seidman, Steinwachs, & Rubin, 2003). These process measures are used to track progress of funded communities in implementing their selected programs. Qualitative nature of process data collected also provided contextual factors that may have been external to SPF that may have influenced implementation.

Community level process data were collected to evaluate progress of community partners in implementing the SPF framework. These include information such as how the

partners expand their prevention capacities, and how they select and implement evidence-based programs and practices. Community partners were also expected to replicate the steps of the SPF framework in line with their state partners. All community partners completed the Community Level Instruments (CLIs) using a web-based system that permitted entry of community-level data into an electronic database. Data entries from communities were then examined by state level evaluators before being submitted to the national cross site evaluation. According to the national cross site evaluation team, CLIs collected standardized data from all funded communities across the 26 funded SPF SIG States (CSAP, 2013).

Collection of Community Level Outcomes Data

Community level outcomes data were not required at the beginning of evaluation of grants funded under SPF SIG system in 2004. However, changes in reporting requirements from the Office of Management and Budget in 2006 (OMB, 2010) necessitated the national evaluation team to request all grantees to collect community level outcomes data. The inclusion of community level outcomes based on epidemiological data from the communities funded under the SPF SIG initiative was important in that the cross-site evaluation design gained strength by assessing time series of outcome data measurement over several time points over the performance period. This assured that those changes in measures over the course of the program can be statistically attributed to changes due to the implementation of SPF.

A primary goal of the evaluation is to assess the impact of the SPF on substance abuse and related consequences at multiple levels. Data needed to address this question

are community level measures of the substance use and related consequence priorities identified by each state and by community participating in the SPF program. These measures are needed for both SPF-funded communities, and also for non-funded communities that provide comparison groups. Multiple intervention points, at least one pre-intervention data point and at least one post-intervention data point, are needed for each measure to be useful to the evaluation of effectiveness of the program.

Instrumentation and Material

Measuring what occurs at each point is necessary to explain cross-site variation in outcomes. The logic model in such measurements includes variations in baseline status, contextual change, and factors that contribute to such changes. Baseline status refers to pre-SPF activities and achievements related to SPF initiated activities. Contextual change refers to anything that occurs in grantees and communities unrelated to the SPF project that may potentially have an impact on systems change and outcomes.

Analyses of baseline and subsequent outcomes data provide a basis for further understanding how implementation of SPF may influence relationships among variables, and thereby influence outcomes. After the project begins, contextual change occurring outside of SPF and the prevention system also can influence SPF implementation and systems change at the grantee level, capacity building, the delivery of prevention interventions, and epidemiological outcomes at the community level. Contextual changes may be incorporated into analyses of outcomes as measured variables, or they may be considered in the interpretation of results.

These data come largely from the following instruments devised by the national evaluation group: State Level Infrastructure Interviews and State Implementation Interviews (SLIs), and Community Level Instruments (CLIs), and Community Outcomes (CO) data. These instruments are included in this dissertation as appendices at the end of the document.

Examples of variations that can occur at the state-level include the degree that community populations are represented in the logic models used to identify communities. At the community-level variations in number and type of environmental strategies implemented or the extent that evidence-based practices are adapted might help explain differences in community-level measures of substance use following the SPF implementation.

Data Sets Used for the Evaluation Study

One of the unique aspects of design of instrumentation for the evaluation study was that states had extensive input on the development, revisions, and piloting of the state- and community-level survey instruments during the first year (CSAP, 2010). This included the formation of a collaborative committee with State evaluators to develop scoring protocols and anchor points for the state-level Infrastructure Interviews (CSAP, 2010, p. 4). Since the purpose of the evaluation is to identify approaches to the SPF that seem to be associated with greater changes in community level measures, assessing progress in implementing the steps of the SPF and identifying variations among the States' processes of implementing the model are both necessary to identify the most successful approaches to SPF. Therefore, several instruments were developed and are included in this dissertation as appendices. Data sets resulting from the efforts and used in this study are listed below.

INF_R1_RUF1_DATA.sas7bdat: Initial state level infrastructure interview surveys that were conducted with state program directors and evaluators.

INF_R2_RUF1_DATA.sas7bdat: Final state level infrastructure interview surveys that were conducted with state program directors and evaluators near the end of the grant program

IMP_R0_RUF1_DATA.sas7bdat: Combined implementation survey results from interviews conducted with state program directors and their evaluators.

CLIP1_R1_RUF1_DATA.sas7bdat: First community level Instrument (CLI) (Part I) survey: These are the web based questionnaires submitted by community programs. Part I describes the communities served by the program, make up of community level partners and infrastructure of the community coalitions. These surveys are updated every six months.

CLIP1_R2_RUF1_DATA.sas7bdat: Second CLI (Part I) survey.

CLIP1_R3_RUF1_DATA.sas7bdat: Third CLI (Part I) survey.

CLIP1_R4_RUF1_DATA.sas7bdat: Fourth CLI (Part I) survey.

CLIP2_R1_RUF1_DATA.sas7bdat: First CLI (Part II) survey: Community level instrument Part II is a web based questionnaire that provides descriptions of the community level strategies and interventions that communities and community coalitions implemented. The survey also provides descriptions of the participants of these interventions.

CLIP2_R2_RUF1_DATA.sas7bdat: Second CLI (Part II) survey

CLIP2_R3_RUF1_DATA.sas7bdat: Third CLI (Part II) survey

CLIP2_R4_RUF1_DATA.sas7bdat: Fourth CLI (Part II) survey

CO_R0_RUF1_DATA.xlsx: Baseline community level outcomes data: These baseline data serve as pre-implementation data for the communities that participated in the grant program.

CO_R1_RUF1_DATA.xlsx: Second community level outcomes data: These are the first post implementation data that was collected one year after the communities began their implementations.

CO_R2_RUF1_DATA.xlsx: Third community level outcomes data (more iterations possible) represents the second post implementation data collected two years after the start of the community implementation.

Analysis Plan

Analytic Approaches

Analytical approach is necessarily derived from research questions asked around two major purposes of this study: (1) to what extent are SPF implemented with fidelity; and (2) what changes occurred across the programs that implemented the programs for substance abuse prevention using the SPF process? Embedded in these research questions are the concept of data driven planning in SPF that asks "To what extent selection of issues driven by local level needs, and capacity based on data collected?"

Fidelity to Implementation of SPF Process to Reduce AOD Use

This is the "Research Question 1". Fidelity can be assessed by to the degree to which a community moves through each of the five-step processes in a manner that adheres to the provided protocol. Data gleaned from state infrastructure interviews and

implementation interviews provides information concerning implementation of SPF by communities. These data are extracted from Implementation Fidelity Data for each of the five steps of SPF. Questions designed to assess implementation fidelity are grouped into "Domains" as described below.

Domains for Step 1 (Assessment) include problem assessment (consumption, consequence and causes), resource assessment, and community readiness. Domains for Step 2 (Capacity) include, data is available for the system to monitor its components, organizational capabilities of the units within the system, and community involvement. Domains for Step 3 (Planning) include, the primary measure of whether this step was conducted at the community level is the existence of a written strategic plan. Additional tool to assess fidelity to the SPF model can be performed by reviewing the strategic plan to see if it includes the key elements leading up to the planning phase.

Domains of Step 4 (Implementation of evidence-based prevention programs) include two steps in considering the core elements of the EBP implementation step of the SPF. First, a community must select the EBP(s) it will implement, and second, the community must develop infrastructure to implement the selected EBP(s) and implement. Domains of Step 5 (Monitoring and evaluation) include many items derived from interviews with evaluator to discuss the community's interventions (i.e., a model that articulates the links between intervention, intervening variables, and outcome targets). This assessment would also assist in understanding of relationships between local, state, and national outcome priorities.

Analysis of the implementation fidelity part of assessment is mainly descriptive through the use of fidelity scores developed by the researchers of the national evaluation team.

Analyses of Evaluation Questions That Deals With Impact

Analysis of quantitative data collected from the evaluation will begin with descriptive and normative reporting using standard statistical methods such as summary statistics (e.g., means and standard deviations), univariate and multivariate frequency distributions.

Research Question #2: To what extent did SPF lead to community level improvements on outcomes? Direct comparisons of funded vs. non-funded communities will provide useful information for the state evaluations of the SPF, and is consistent with the focus of the SPF on statewide and communitywide (i.e., population-level) impacts. The data include all funded and non-funded communities within a particular SPF state, and outcomes are analyzed at community-level.

Research Question #3: What accounted for variations in outcomes across communities? The Question 3 analysis includes funded communities within SPF states only, and outcomes are analyzed at both state and community levels. Interactions between moderators and mediators can be examined as well as main effects (e.g., did implementation of interventions with cultural competence have a greater effect on reducing substance use in communities with higher initial readiness to change).

Hypothesis Testing

The level at which the analyses are conducted, state or community, varied according to hypotheses being addressed. Hypothesis 1 dealt with implementation fidelity, the first research question. It focused on whether the SPF SIG grantees implemented the framework processes as prescribed by the SPF. The Null hypothesis (H01) was that individual grantees did not implement the framework with fidelity, that is implementation scores were less than 2.0 (medium implementation). The Alternative Hypothesis (Ha1) was that implementation scores were 2.0 or greater.

Hypothesis 2 focused on whether states funded by the SPF SIGs were successful in achieving positive changes in contributing factors among their targeted communities. This aligns with the Impact Question #1 (To what extent did SPF lead to community level improvements on outcomes?). The Null hypothesis (H02) was that there were no changes among the targeted communities. The Alternative Hypothesis (Ha2) was that there were statistically significant changes among the targeted communities.

For Hypothesis 2, pre- and post-intervention estimates were examined to determine whether improvement in the contributing factors occurred in each targeting community. For each state, a contributing factor was classified as changing positively, negatively, or not at all, depending on whether the majority of communities targeting the contributing factor demonstrated improvements.

Hypothesis 3 focused on factors behind the observed changes in contrast to those observed in the state's comparison communities. Each state contributed multiple data points based on the number of contributing factors available for that state, with state-level

measures reflecting roll-ups (as previously defined) of community-level data. This aligns with the Impact Question #2: What accounted for variations in outcomes across communities? The Null Hypothesis (H03) was that there were no differences between the funded communities and communities that were not targeted. The Alternative Hypothesis (Ha3) was that there were differentiating factors that may explain significant differences between the targeted communities and non-targeted communities,

Examination of Hypothesis 3 contrasted factors in targeting communities to improvements in comparison communities. To test this hypothesis, data in the community level instruments were contrasted with processes in comparison communities. For each state, comparisons are made of numbers of changes that favored targeted communities to those that favored comparison communities. Since targeting may be effective due to a particular state's efforts, numbers of contributing factor were considered in each state where targeting communities outperformed the contrast communities. Finally, the effectiveness of targeting is summarized across states for each intervening variable areas.

These analyses began with examination of the distributional characteristics of the data, and assess the baseline differences among all the groups being compared. Standard descriptive methods were used for analyzing, displaying, and reporting descriptive data. These include summary statistics (e.g., means and standard deviations), univariate and multivariate frequency distributions.

Inferential Analyses

Statistical significance in changes between community level outcomes were tested with the Student's *t* Test for differences between two sample means. The *t*-test for two related sample means were used for comparison of differences in pre and post outcomes, and the *t*-test for two independent sample means were used to contrast differences between outcomes from targeted communities and comparison communities.

A ***t*-**test is a statistical test that is used "to determine whether a hypothesis follows a Student's *t*-distribution under the null hypothesis" (Gerstman, 2008). It can be used to determine if two sets of data are significantly different from each other. Scores will be interpreted as statistically significantly if the associated *t* table (Appendix F) using the appropriate values of α of 0.05, if the absolute value of the test statistics for two tailed test is greater than the critical value (0.975), then null hypothesis is rejected.

States were encouraged to collect considerable information regarding characteristics of the intervention communities, including the specific intervention activities they implement and various measures of implementation level (e.g., dosage and fidelity). The evaluation team also collected data from the funded communities via the web-based community-level survey, that were made available to the state coordinators and evaluators in analyzable form. These data, along with any state-specific data, can facilitate an exploration by individual states of the relationships between such characteristics and the outcomes achieved in their state.

As discussed above, it is likely that impacts on pre-defined outcome measures will, for most states, be concentrated primarily in the subset of communities that receive

SPF funding. Therefore, the evaluation will also compare communities that either receive or do not receive SPF funding and support. Community-level data from both SPF and non-SPF communities in the SPF states will provide a very substantial number of communities upon which to base the analysis, thus providing a level of statistical power for assessing community level impacts of the SPF that goes far beyond what individual state analyses can offer. It will also allow for extensive subgroup analysis among intervention communities in order to examine community characteristics that are associated with the level of outcomes achieved. To address this question, community-level outcome data were assembled, as described above for question 2 from states.

At a minimum, it is expected that states will provide summary data at the community level (i.e., means, percentages, rates, etc.) for as many outcome measures as data are available. The analysis will be more powerful – both statistically and inferentially – where multiple time points are available both before and after implementation, rather than a single pre- and post-test. Due to the anticipated large N of communities involved, and the added power of longitudinal data, where available, analysis of the community-level indicators should provide reasonable statistical power to detect nontrivial intervention effects.

Protection of Participant Protection

Walden University Institutional Review Board (IRB) requirements were waived this study because I used secondary data deposited into ICPSR (Walden University, 2016). The original data source for the national SPF SIG cross site evaluation study has been obtained from ICPSR. It is available to researchers that are associated with ICPSR

member institutions. The original data source, names or other subject unique identifiers are not obtained from the data collection. Additionally, no publicly available files include medical record numbers, date of birth, admission and discharge dates and any other individual identifiers. These restrictions on uses of the public data set ensure protection of confidentiality and privacy and bring the data sets into compliance with the Health Insurance Portability and Accountability Act (HIPAA), as well as the Public Health Service Act. The Public Health Service Act states that data collected by the National Center for Health Statistics can only be used for health reporting and analysis, and prohibits any other use or attempts to determine the identity of a case (National Center for Health Statistics, 2007).

Summary

Wholey originally coined the term "evaluability assessment" (1979). He recommended evaluability assessment as an initial step to evaluating programs. It is an important issue if an evaluation project seeks to be perceived as scientific in its approach. It is also important also for evaluation projects to be deemed trustworthy by stakeholders. With such things in mind, assessment of evaluability must begin by identifying steps that need to be taken first, such as assessment of capacity and clarifying logic models.

There are two major reasons for mentioning the evaluability assessment as a part of a discussion on evaluation of programs such as SPF. The first reason is to bring attention to a major drawback of attempting to examine effectiveness of programs across elements, especially when the framework emphasizes flexibility in planning and diversity of implementation approaches. This is important at both policy and scientific levels.

While acknowledging the scientific value of a cross-site analysis that pools communities across States and analyzes variation in outcomes across all communities addressing questions about whether some SPF steps are more critical in predicting outcomes than others, which intervention strategies tend to work best for which target priorities.

CSAP, in describing the need for cross evaluation, expressed the view that it is important to identify which specific States were successful and why for the purposes of policy. As the grant recipients, the jurisdictions are both accountable for the funding and the implementation of the model. Consequently, they are the prime stakeholders for whom the findings will be actionable, and one of the prime consumers of lessons learned. Therefore, for the results to be maximally useful for SAMHSA and jurisdictional prevention authorities, it is necessary to identify characteristics of communities and their implementation of the SPF SIG that are associated with success in achieving desired outcomes. Thus, it follows that, as a prerequisite, it is important to know which jurisdictions were successful in achieving their priority outcomes and, by extension, which jurisdictions implemented evaluations with a level of interpretability that could demonstrate success if achieved.

There is a scientific justification for this approach as well, in that it serves as a reminder that ecological fallacies can result from analyses that inadequately attend to variability across sites. For example, null findings from analyses at the cross-site level could suggest that fidelity of community implementation did not predict outcomes, while analyses at the state level might show a clear positive relationship between community fidelity and outcomes in some states but not others. In that case, the cross-site analysis

alone would be misleading, because it would suggest a conclusion that implementation fidelity did not matter, when in fact fidelity may have mattered but was masked by the heterogeneity in the cross-site analysis.

The second reason for mentioning "evaluability assessment" of programs such as SPF across diverse sites is to reassess and modify the design of cross site evaluation as needed. It has always been one of primary goals of those who design and implement substance abuse prevention programs to design a program that is rigorous and scientifically defensible, while seeking sensitivity to detect effects when they exist. They would fail if evaluation design fails to assess potential noise and bias.

There are many failed programs that could have benefited from evaluability assessment since it would be likely that evaluation assessment would have revealed some fatal vulnerability before they spent resources to design and implement their programs. For example, it is becoming clear that some of the community outcome measures being used by the states map poorly onto the outcomes they are targeting, are weak proxies, or have other significant problems. By ignoring this information we would substantially reduce the power to detect effects of the SPF initiative as a whole, and bias our estimates of the magnitude of those effects.

One important point that must be made on evaluating programs in real world situation is that of unforeseen problem of worldwide economic downturn that all states experience during 2008 depression. State budget cuts triggered interruption of data collection, negatively impacting designs. In one State, an elegant multivariate matching design was ruined when the annual State school survey providing the longitudinal

outcome observations was cancelled for at least two years. This effectively reduced the evaluation to archival records that only marginally mapped onto the targeted priorities. It is difficult to assess what effects or how widespread these problems with data collection had from such unforeseen external factors.

Chapter 4: Results

In this chapter, I describe the results of the study to assess the effectiveness of the SPF. The purpose of this study was two-fold; the first was to determine the implementation fidelity of the programs that used the SPF process, and the second was to assess the effectiveness of the SPF process. Research questions addressed the extent of fidelity to the SPF process by grantees of SPF SIG in implementing the system. The second research question sought to answer if implementation of SPF has brought about positive changes as intended by the framework. Third research question then followed by asking if there were changes, what factors were associated with those changes.

Sample Selections

While the SPF SIG grant program is still on-going, the national cross site evaluation team has the data from first two cohorts of the program made available through the ICPSR (2014). This enabled me to ascertain the effectiveness of the SPF model. Table 1 provides an overall description of the SPF SIG program by cohorts. The first criterion of inclusion and exclusion of samples for the study was availability of comparison samples. Out of 26 states funded in first two cohorts of SPF SIGs, seven states reported data on targeted communities versus comparison communities. The difference between these communities was that the targeted communities were funded by their states to implement SPF SIGs and comparison communities were not funded with SPF SIGs. Table 2 describes seven grantees by the number of subrecipient communities after the application of the first criterion of exclusion.

Table 1

SPF SIGs by Cohorts

SPF SIG cohort/Number of grantees	Start date	End date
Cohort 1 (21)	October 2004	September 2010
Cohort 2 (5)	July 2005	June 2011
Cohort 3 (19)	October 2006	September 2012
Cohort 4 (24)	October 2009	September 2015
Cohort 5 (10)	October 2010	September 2016
Cohort 6	October 2013	September 2019

Table 2

Sample Inclusion #1

State	# targeted communities	# comparison communities
Arkansas (26)	13	13
Kentucky (03)	01	02
New Mexico (22)	13	09
North Carolina (36)	18	18
Tennessee (08)	04	04
Vermont (44)	24	20
Washington (47)	12	35

The second criterion of inclusion/exclusion of the study was the availability of pre- and post-implementation data. Of these seven states, four states (Kentucky, New Mexico, Vermont, and Washington) reported pre-implementation outcomes data and at least 2 years of post-implementation outcome data points. The post-implementation data points are defined as data collected at least 1 year after the implementation of interventions started.

The last criterion of inclusion/exclusion was determined by sample size selection. A review of the literature in behavioral health assisted me in determining the magnitude of effect sizes. Lipsey and Wilson (1993) provided effect sizes for a number of psychological, educational, and behavioral treatments. In this study, medium effect size is expected (Hallahan & Rosenthal, 1996). Using Cohen's *d* table provided (Table 3), it was determined that at $\alpha = 0.5$ and at medium power (0.80), a two tailed *t* test for two independent samples required a minimum sample size of 26.

Table 3

Cohen's d Table to Determine Minimum Sample Size

		Cohen's *d*	
Power	0.2	0.5	0.8
0.25	84	14	6
0.50	193	32	13
0.60	246	40	16
0.70	310	50	20
0.80	393	64	26
0.90	526	85	34
0.95	651	105	42
0.99	920	148	58

Note. The table is adopted from Hallahan & Rosenthal (Hallahan, M. & Rosenthal, R. (1996). Statistical power: Concepts, procedures and applications. *Behaviour Research and Therapy*, *34*, 5/6, 489-499.).

Since the main focus of the study was underage alcohol abuse, two states with the largest numbers of communities that implemented interventions targeting underage drinking were selected to ensure that there were at least 26 communities that satisfied all of the criteria of inclusion at all levels of implementation. These are Vermont with 24

targeted communities and Washington state with 12 targeted communities. Unless otherwise stated, all analyses are performed on Vermont and Washington and their communities.

Background Data on Vermont and Washington SPF SIGs

In order to investigate the appropriateness of using the data from SPF SIG programs from the two states, some basic data and information on these states were collected. Vermont is a state in the northeastern United States with a population of 626,562, and Washington is a state in the Pacific Northwest with a population of 7,170,350 (U.S. Census, 2016 http://census.gov/library/publications.html).

Vermont

The state of Vermont was funded with SPF SIG as a part of five Cohort II grantees funded in 2005. Vermont completed the grant in 2011 and finished collecting outcomes data in 2013; its data sets were deposited into ICPSR in 2014. Annual Funding was at 2.33 million dollars over 6 years, and total funding over the life of the grant was 11.65 million dollars.

Vermont funded 24 communities, and these communities implemented a total of 183 interventions. The state selected priorities so that communities may refine prevention strategies. Vermont implemented the SPF model and identified the following three priorities for prevention: "(a) Reduce underage drinking; (b) Reduce high-risk drinking among persons under 25 years old; and (c) Reduce marijuana use among persons under 25 years old." (Vermont Department of Health, 2012, p. 2). One of the most important attributes of its program was that of the partnerships with other community organizations.

Washington

Washington was funded with SPF SIG as a part of 19 Cohort I grantees funded in 2004. Washington completed the grant in 2010 and finished collecting outcomes data in 2013; its data sets were deposited into ICPSR in 2014. Annual funding was at 2.35 million dollars over 6 years, and total funding over the life of the grant was 11.75 million dollars.

Washington state funded 12 community partners, and these communities implemented 90 interventions. Washington implemented the SPF model and identified the following prevention priorities: reduce underage drinking and driving after drinking. Washington selected culturally and demographically diverse locations for SPF SIG funding. The populations of the 12 SPF SIG communities ranged from 700 to 72,000, with two communities featuring high concentrations of Native American students and several others including large Hispanic communities. Washington worked with community leaders and key stakeholders to ensure that cultural norms and practices were incorporated into prevention efforts and that cultural competency was implemented throughout the program, including the translation of SPF SIG materials. Evaluators also assisted communities in reviewing and updating their prevention models for cultural competence based on survey results from first-year SPF SIG programs.

Research Question 1: Implementation Fidelity

The evaluation team interviewed the state level evaluators three times over the evaluation period. Round 1(R1) interviews were performed shortly after the approval of the strategic plans (after Step 3 of SPF) for the determination of the baseline status.

Round 2 (R2) interviews were performed near the end of the implementation of SPF steps. Round 3 (R3) interviews were performed 1 year after the grants ended.

The evaluation team designed groups of questions called domains for each step of the SPF process, based on strategic plans submitted by SPF SIG grantees. Data from these interviews were used to create implementation scores for each state and community which, in turn, were used to assess the extent to which SPF-SIG implementation contributed to infrastructure change. The process for coding all interviews was consistent, and scores were generated ranging from 1to 3 (*no/low fidelity, medium fidelity, high fidelity*).

Tables 4 through 13 show the implementation scores of all five steps categorized by the individual domains for each of the states studied. These are accompanied by keys to domains in each step. Table 4 is a summary table that displays average implementation scores for all the steps of each state. Not all the tables show the same domains because some domains were not tested on certain communities and some scores for some communities are not displayed because they were missing from the database. Note that some tables do not show all communities for all steps and all domains within those steps. That is because either some state evaluators did not evaluate all communities or some communities did not respond to all of the domains in some steps.

Table 4

Mean Implementation Step 1 Scores of All Communities

State	Domain							
	1	2	3	4	5	6	7	8
Vermont	2.75	2.15	2.29	2.44	2.28		2.72	2.33
Washington	2.41	2.41	2.18	2.64	2.73	2.09	2.07	2.17

Table 5

Key for Step 1 Domains

Domains	**Descriptions**
1-1	Needs assessment management
1-2	Requisite skills for needs assessment
1-3	Data acquisition capacity 1
1-4	Data analysis capacity
1-5	Needs assessment results used to specify target issues
1-6	Needs assessment results used to specify geographic targets
1-7	Data used to specify interventions
1-8	Gaps in prevention resources

Table 6

Mean Implementation Step 2 Scores of All Communities

State	Domain								
	1	2	3	4	5	6	7	8	9
Vermont	1.70	1.54	2.07		2.07	1.31	2.48		1.70
Washington	2.00	1.75	1.54	1.63	1.94	1.25	2.00	2.17	1.75

Table 7

Key for Step 2 Domains

Domains	**Descriptions**
2-1	Capacity building efforts directed at identified resource
2-2	Capacity building efforts clearly documented
2-3	Community education and recruitment efforts directed at identified resources
2-4	Community education and recruitment efforts clearly documented
2-5	Missing partners systematically identified and recruited
2-6	Recruitment and membership procedures established and observed
2-7	Coalition meeting infrastructure established
2-8	Guidance from target populations sought and used
2-9	Prevention project and outcomes sustainable

Table 8

Mean Implementation Step 3 Scores of All Communities

State	Domain								
	1	2	3	4	5	6	7	8	9
Vermont	1.93	2.30	2.24	1.83	2.08	1.94	1.91	1.91	1.92
Washington	2.17	2.67	2.46	2.17	2.52	1.71	2.50	2.64	

Table 9

Key for Step 3 Domains

Domains	**Descriptions**
3-1	Strategic plan (SP) includes vision for prevention activities
3-2	SP uses assessment results
3-3	SP includes State's priorities for prevention
3-4	Capacity & infrastructure measures incorporated into plans
3-5	SP identifies appropriate EB strategies for addressing prior
3-6	Will implement culturally appropriate strategies with competency
3-7	Methods & measures for monitoring outcomes
3-8	Will develop sustainability plan

Table 10

Mean Implementation Step 4 Scores of All Communities

State	Domain					
	1	2	3	4	5	6
Vermont	2.25	2.12	1.78	1.88	1.64	1.48
Washington	2.58	2.54	2.88	2.29	2.29	2.13

Table 11

Key for Step 4 Domains

Domains	**Descriptions**
4-1	Needs assessment used to identify potential EBPPPs
4-2	Identification of EBPPPs is consistent with logic model
4-3	Identified EBPPPs selected from credible sources
4-4	Other (non EBPPP) programs selected or designed consistent
4-5	Implementation requirements considered in selecting EBPPPs
4-6	Needed adaptations in EBPPP implementation determined

Table 12

Mean Implementation Step 5 Scores of All Communities

State	Domain										
	1	2	3	4	5	6	7	8	9	10	11
Vermont	2.69			1.97	1.82					1.96	
Washington	2.83	3.00	2.30	2.54	2.50	1.96	2.88	2.42	1.71	1.63	1.85

Table 13

Key for Step 5 Domains

Domains	**Descriptions**
5-1	Community logic models developed
5-2	Community hired or consulted with an evaluator
5-3	Community understands relationships between local & state
5-4	Measures identified for local and state priorities
5-5	Outcome data collection procedures developed
5-6	Fidelity data collection procedures developed
5-7	Evaluation capacity developed
5-8	Plans developed for local evaluation procedures
5-9	Plans developed for feedback from evaluator to community
5-10	Community intent to use feedback to inform future prevention
5-11	Process identified for monitoring 5 SPF steps

Summary of Results From Research Question 1

The tables illustrate the variable nature of questions asked in the implementation of SPF steps. Some community data were not available because they simply did not participate in the implementation surveys. In other cases, states did not ask all of the domain questions made available to the state level grantees.

Hypothesis 1 deals with implementation fidelity. It focuses on whether the SPF SIG grantees implemented the framework processes as prescribed by the SPF. The null hypothesis ($H_0$1) is that individual grantees did not implement the framework with

fidelity, that is, implementation scores were less than 2 (medium implementation). The alternative hypothesis (H_a1) is that implementation scores were 2.0 or greater.

All communities were scored from 1 to 3 (1 being low, 3 being high), and scores were aggregated. All implementation score with 2.0 (medium) or over were deemed passing scores by the evaluation team. Table 14 below shows the summary statistics for the overall implementation scores. Detailed individual implementation scores collected for all domains of all steps implemented by all communities are included in Appendix B. Average implementation scores for all steps of the SPF were above 2.0, except for the Step 2. Implementation score for capacity building (Step 2) averaged 1.79, considerably below 2.0 thresholds.

Table 14

Summary of Implementation Scores for SPF Steps

	Step 1	Step 2	Step 3	Step 4	Step 5	Mean Score
Vermont	2.37	1.80	2.02	1.86	2.69	2.148
Washington	2.33	1.78	2.63	2.45	2.33	2.304

Combined scores of domains within step 2 indicated that communities had difficulties in documentation of capacity building, community education and recruitment efforts. Difficulties in recruiting community members were among the noted deficiencies. Evaluators also questioned sustainability of the prevention projects selected for implementation.

Since mean implementation scores for both Vermont (2.148) and Washington (2.304) were above the threshold of 2.0, the alternative hypothesis is accepted. Thus, it is concluded that implementation fidelity was achieved and the first research question was

answered affirmatively. It is further noted that all implementation scores were at least 2.0 at R3 (Edwards, Stein-Seroussi, Flewelling, Orwin, & Zhang, 2015).

Assessment of Community Processes and Outcomes

A total of 450 communities in all states funded in first two cohorts of SPF SIG provided data for the cross-site evaluation. For the purpose of investigating community level data to answer Research Questions #2 and #3, all 36 funded communities and 55 comparison communities from both Vermont and Washington State were included in this analysis. Sample N is inclusive of all communities that provide their data for the present analyses. For this part of the evaluation, community process data are qualitative data extracted for the Community Level Instruments (CLIs) and community outcomes data are from communities.

Two outcome indicators were collected by communities in each of the state. One was a required indicator, the prevalence of underage drinking in past 30 days. The other was chosen by the individual states and communities based on their own needs assessments. Vermont chose marijuana use as its second outcome measure and Washington State chose students reporting having ridden in car with driver who had been drinking in past 30 days as its second outcome measure. Only the outcomes from the first required indicator were chosen for this analysis.

As noted before, community partners (CP) submitted data for process evaluation to the cross-site evaluation twice a year through CLIs, web-based data collection tool as described in Chapter 3. These process measures are used to track progress of funded communities in implementing their selected programs. Qualitative nature of process data

collected also provided contextual factors that may have been external to SPF that may have influenced implementation. Baseline process data were constructed from responses from the first CLI submissions from CPs and all subsequent submissions were recorded as follow-up.

Community level outcomes data were collected annually. The baseline data for each community is defined as the first data collected at the time of beginning of implementation of SPF in its community. All subsequent outcome measure data collections were considered post-implementation data. Most of the community level outcomes data were collected as a part of state-level school surveys. Community level outcomes data of both of the states were from their state-level student surveys. However, these state level surveys closely approximated questions contained in the national surveys such as YRBS and NSDUH. Therefore, comparability of data were not an issue in analytical phases of this study.

Where small sample sizes were issue, these states may aggregate across years when they report community level outcomes data. Some baseline data may be the results of aggregation of up to two contiguous years of data collections leading to the first year of implementation of SPF at community level. Post-intervention data points, likewise, may be aggregates of up to two data points following the first year of implementation of SPF. Because communities within a state often varied with respect to when interventions were implemented, the years defining pre- and post-intervention periods also varied across communities examined in these analyses. Change scores were then calculated by comparing these pre and post implementation data points.

Research Question #2: Evidence of Positive Changes Intended by SPF

All communities in Vermont and Washington targeted underage drinking as their priority and chose alcohol use in past 30 days as the outcome measures for this priority.

Vermont

All 24 communities reported on alcohol use in past 30 days. Of these, 22 communities reported a decrease in past 30 day alcohol use by 9-12 graders, with the average use rate decreasing from 41.8% to 35.8%**.**

Table 15

Percent of Students Reporting Alcohol Use in Past 30 Days - Students in Grades 9-12, Pre and Post Analysis (Vermont)

	Pre-Post Analysis
Number of targeting communities:	24
Decreased:	22
Decreased significantly:	13
Increased significantly:	1
Targeting communities pooled pre-test value (%):	41.8
Targeting communities pooled post-test value (%):	35.8

T Test for pre-post changes: T test for paired samples

The null hypothesis assumes that the difference between the pre-test mean and the comparison post-test value is equal to zero. The two-tailed alternative hypothesis (H1H1) assumes that the difference between the true mean and the comparison value is not equal to zero.

Formula for the test statistic:

$$t = \frac{\frac{\Sigma d}{N}}{\sqrt{\frac{\Sigma d^2 - \frac{(\Sigma d)^2}{N}}{N(N-1)}}}$$

where d = difference between matched scores
N = number of pairs of scores
df = N – 1
∑d = -71.9, N= 24, *df* = 23. Therefore, $t(23) = -2.35$, $p<.05$.

T statistics (critical value) for t.975 at *df* of 23 (Two tailed) from the *t*-table = 2.069.

Since t value of -2.35 is larger than the critical value, the null hypothesis is rejected.

Analysis of differences between targeted communities and control communities

Vermont reported on 24 targeted communities and 20 comparison communities as described in Table 16 below.

Table 16.

Percent of Students Reporting Alcohol Use in Past 30 Days - Students in Grades 9-12, Targeted Communities vs. Comparison Communities (Vermont)

Comparative Analysis	
N targeting communities (N comp communities):	24 (20)
Decreased relative to comparison mean (number of communities):	18
Targeting communities pooled pre-post change:	6.0
Comp communities pooled pre-post change:	3.9
t-test value for diff in pre-post change df=42:	2.40

T Test for targeted communities versus comparison communities

The formula to calculate the *t-ratio*.

$$t = \frac{M_X - M_Y}{\sqrt{\left[\frac{\left(\Sigma X^2 - \frac{(\Sigma X)^2}{N_X}\right) + \left(\Sigma Y^2 - \frac{(\Sigma Y)^2}{N_Y}\right)}{N_X + N_Y - 2}\right] \cdot \left[\frac{1}{N_X} + \frac{1}{N_Y}\right]}}$$

Σ = sum the following scores
M_X = mean for Group A
M_Y = mean for Group B
X = score in Group 1
Y = score in Group 2
N_X = number of scores in Group 1
N_Y = number of scores in Group 2

$\sum X = 145$, $\sum Y = 79$
$M_x = 6.0$, $M_y = 3.9$
$N_x = 24$, $N_y = 20$

$df = (N_x - 1) + (N_y - 1) = 23 + 19 = 42$

The obtained value of t = 2.40, *df* = 42 exceeds the cut off of critical value 2.021 shown on the table at the 0.05 level. Therefore, $t(42) = 2.40$, $p<.05$. Since *t* value of 2.40 is larger than the critical value, the null hypothesis is rejected.

Figure 3 depicted below is a graphic representation of the results of comparison of pre- and post-implementation data from targeted communities and comparison communities.

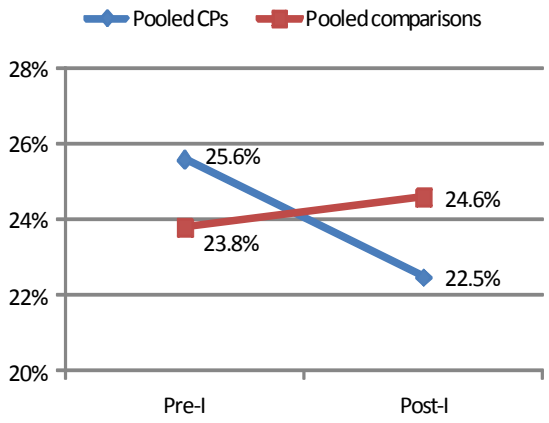

Figure 3. Percent of Students Reporting Any Alcohol Use in Past 30 Days (Vermont)

Washington

All 12 community partners targeted their prevention activities to reduce underage drinking. 8 of 12 community partners saw a decrease in the percent of students in grade 8 that reported any alcohol use in the past 30 day from the pre– to post-intervention period. There was a 3.0% decrease in the percent of 8th grade students reporting alcohol use in the past 30 days, from 22.7% during the pre-intervention period to 19.7% during the post-intervention period as shown in Table 17.

Table 17

Percent of Students Reporting Alcohol Use in Past 30 Days, Pre-Post Analysis (Washington)

	Pre-Post Analysis
Number of targeting communities:	12
Decreased:	8
Decreased significantly:	7
Increased significantly:	2
Targeting communities pooled pre-test value (%):	22.7
Targeting communities pooled post-test value (%):	19.7
t-test value for pre-post change	2.201

T Test for pre-post changes: T test for paired samples

The null hypothesis assumes that the difference between the pre-test mean and the comparison post-test value is equal to zero. The two-tailed alternative hypothesis (H1H1) assumes that the difference between the true mean and the comparison value is not equal to zero.

Formula for the test statistic:

$$t = \frac{\frac{\Sigma d}{N}}{\sqrt{\frac{\Sigma d^2 - \frac{(\Sigma d)^2}{N}}{N(N-1)}}}$$

where d = difference between matched scores
N = number of pairs of scores
df = N – 1

∑d = -35.9, N= 12, *df* = 11. Therefore, *t* = -1.49

T statistics (critical value) for t.975 at *df* of 11 (Two tailed) from the *t*-table = 2.201. Since t value of -1.49 is smaller than the critical value, the null hypothesis is accepted. It is thus concluded that even though outcomes from targeted communities decreased, it is not statistically significant change.

Table 18 below describes the results for comparison of preimplementation data and post implementation data on underage drinking measure of 30 day use of alcohol in communities in Vermont.

Table 18

Percent of Students Reporting Alcohol Use in Past 30 Days, Targeted Communities vs. Comparison Communities (Washington)

Comparative Analysis	
N targeting communities (N comp communities):	12 (35)
Decreased relative to comparison mean:	7
Targeting communities pooled pre-post change:	3.0
Comp communities pooled pre-post change:	5.1

Mean outcomes from comparison communities are clearly exhibit more changes than the outcomes pooled from the targeted communities as shown in Figure 4 depicted below. Thus it can be safely concluded that implementation of SPF process did not make significant difference towards desired outcomes.

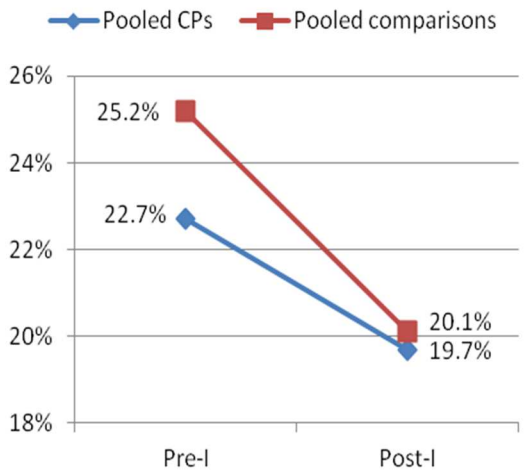

Figure 1. Percent students reporting any alcohol use in past 30 days (Washington State)

Summary of Results From Research Question 2

Majority of communities in Vermont (22 out of 24 communities) reported decrease in past 30 day alcohol use by 9-12 graders, with the average use rate decreasing from 41.8 percent to 35.8 percent, over the four years of SPF implementation at

community level. In Washington State, 8 of 12 community partners saw a decrease in the percent of students in grade 8 that reported any alcohol use in the past 30 day from the pre– to post-intervention period. There was a 3.0% decrease from 22.7% during the pre-intervention period to 19.7% during the post-intervention period.

Research Question #3: Factors Associated With Changes

Data analyzed for this research question were extracted from the process data reported to the national cross site evaluation team through web-based Community Level Instruments (CLIs). CLI data are collected throughout the year after the community level implementation and submitted twice a year until the end of the SPF SIG funding. This ensured collection of community level process data for at least four rounds of collection. There are two parts to CLIs. CLI Part I report on community level infrastructure and background on community make-up and capacity. CLI Part II provided detailed information on intervention efforts of individual communities. Communities are required to fill the "Coalition Sub-Forms" included in CLI Part II. Most of the information used to answer the Research Question #3 was gleaned from this form. CLI survey instruments are provided as appendices to this dissertation.

Community Level Implementation Measures

The national evaluation team grouped the implementation measures into six domains; (1) Mission/Vision, (2) Organizational structure, (3) Leadership, (4) Process tracking, (5) community outreach, and (6) and Data infrastructure. In addition, they scored the community implementation on cultural competence and sustainability, two overarching principles behind the SPF. All survey items gleaned from CLIs are

categorized under these domains. Table 19 provides a summary of community level implementation measures and measurement scales used by the SPF SIG cross site evaluation team. Full description of implementation measures and measurement scales is included as Appendix E at the end of this document.

Table 19

Community Implementation Measures and Measurement Scales

Implementation Measures	*Measurement Scales*
Mission/Vision	
The coalition has a clear vision and focus.	1 = strongly disagree; 5 = strongly agree
Organizational Structure	
The coalition has a broad-based, diverse membership that represents the various groups and organizations involved in substance use prevention.	1 = strongly disagree; 5 = strongly agree
The coalition needs more structure in order to be effective. (Reverse coded)	1 = strongly agree; 5 = strongly disagree
Responsibilities among coalition members are fairly and effectively delegated.	1 = strongly disagree; 5 = strongly agree
Leadership	
Is the leader of the coalition a paid position?	0 = No; 1 = Yes
The community coalition has a collaborative leadership.	1 = strongly disagree; 5 = strongly agree
Process Tracking	
There is too much talking and not enough follow through with actions. (Reverse coded)	1 = strongly agree; 5 = strongly disagree
The coalition has a process for tracking decisions.	1 = strongly disagree; 5 = strongly agree
The coalition does not monitor whether or not there is follow through on decisions. (Reverse coded)	1 = strongly agree; 5 = strongly disagree
Community Outreach	
Number of key partners	(maximum value = 16).
Indicate which community members and/or groups you are focusing your awareness raising efforts on.	Number of unique members/groups across all waves (max. value=16).
Indicate the activities that are being conducted to raise awareness.	Number of unique mediums selected across all waves (maximum value = 5)
Data Infrastructure	
Indicate the types of data you used in conducting your needs and resources assessment and indicate if the data were provided to you by the State Epidemiology and Outcomes Workgroup.	Number of unique data sources used across all waves (maximum value = 12)
Cultural Competence	0 = no areas selected; 1 = at least one area selected
Indicate the areas in which you, as the community partner, have formal, written policies and practices in place to address.	
Sustainability	0 = No; 1 = Yes
Do you currently receive alcohol, tobacco or other drug prevention funding from sources other than the SPF SIG Initiative?	

As noted in the table, three items were reverse coded to maintain consistent direction of positive-negative relationship of processes measured. Some items were coded as cumulative numbers and not included in calculation of values for item with Likert Scale outcomes.

Change Scores

The analyses employed here assesses whether community implementation scores improved with time in conjunction with improvement of outcomes measures. Mean baseline values for each implementation measure are reported as "Pre Mean" and follow-up mean values are reported as "Post Mean". The difference between "PreMean" and "Post Mean" is defined as change scores. Summary statistics are presented in one table to illustrate the change scores for each implementation measure in Table 20 below.

Table 20

Changes in Implementation Scores, Pre and Post Implementation (N=36)

Measure	Pre Mean (*SD*)	Post Mean (*SD*)	Mean difference	*t* statistic (*df*)	*p* value
Has a clear vision and focus	4.5 (0.7)	4.7 (0.6)	0.17	3.84 (35)	< 0.05
Broad-based, diverse membership	4.1 (0.8)	4.2 (0.8)	0.10	2.49 (35)	< 0.05
Needs more structure to be effective	3.3 (1.1)	3.4 (1.1)	0.13	2.24 (35)	< 0.05
Responsibilities are fairly and effectively delegated	3.6 (0.9)	3.8 (0.8)	0.17	4.60 (35)	< 0.05
Has collaborative leadership	4.4 (0.7)	4.5 (0.7)	0.09	2.59 (35)	< 0.05
Not enough follow-through	3.7 (0.9)	3.9 (0.9)	0.20	3.97 (35)	< 0.05
Has a process for tracking decisions	3.9 (0.8)	4.0 (0.8)	0.16	3.64 (35)	< 0.05
Does not monitor whether there is follow-through	3.9 (0.8)	4.1 (0.7)	0.15	3.80 (35)	< 0.05

The *t*-test for paired means was used to determine statistical significance of change scores of all implementation measures. Null hypothesis for the t-test is that post-implementation results were not different from pre-implementation results: Ho: $M_D = M_1 -$

$M_2 = 0$ where M_D equals the mean of the score difference across two measurements. The results of two tailed t-test at significance level $p \leq 0.05$, $t = (M - \mu)/S_M$ are shown in Table 20. Therefore, the differences between pre and post means were significant. All of the test items on community organizational scores showed positive changes and changes were statistically significant. Thus, the null hypothesis is rejected for all items.

Since all communities measured prevalence of current alcohol use in adolescent to track SPF implementation outcomes, change scores for this outcome was calculated by comparing the pre-intervention prevalence value as baseline data and follow-up data points for post-intervention values. Change scores were calculated for all communities that provided requisite data ranged from –12.2% to +15.0%. Negative change scores denote less desirable outcome since the post implementation scores were subtracted from the pre-implementation scores. This meant range of prevalence of underage drinking prevalence went from 15 percent decrease to 12.2 increase with mean value of +2.9% (sd = 5.3), meaning overall decrease of prevalence of current alcohol drinking of 2.9 percent.

With respect to the associations between implementation process at community level outcomes data on prevalence of alcohol use, majority (29 of the 32 at 91%) were positively associated. Therefore, the results show high degree of association between higher implementation scores and larger decreases in current alcohol use in adolescents.

Summary

Research Question #1: Implementation Fidelity

Hypothesis 1 focused on whether the SPF SIG grantees implemented the framework processes as prescribed by the SPF. The Null hypothesis (H01) was that

individual grantees did not implement the framework with fidelity, that is, implementation scores were less than 2 (medium implementation). The Alternative Hypothesis (Ha1) is that implementation scores were 2.0 or greater. Since the means of all implementation scores of all communities that implemented SPF were 2.148 for Vermont and 2.304 for Washington, it was determined that communities implemented SPF with fidelity. This was confirmed through another study by the national evaluation of sustainability study that was performed a years after the end of the SPF SIG grants (Edwards, Stein-Seroussi, Flewelling, Orwin, & Zhang, 2015).

Research Question #2: Changes in Community Level Outcomes

Analysis of the associations between SPF implementation and reductions in underage drinking was performed on data submitted by communities in the study states. Majority of communities in Vermont (22 out of 24 communities) reported decrease in past 30 day alcohol use by 9-12 graders, with the average use rate decreasing from 41.8 percent to 35.8 percent, over the four years of SPF implementation at community level. In Washington State, 8 of 12 community partners saw a small decrease from 22.7% during the pre-intervention period to 19.7**%** during the post-intervention period.

Since results of the study on implantation fidelity on both Vermont and Washington states showed that their communities implemented SPF process satisfactorily and communities in both states showed improvements in the outcome measures utilized to track the implementation, it can be said that faithful implementation of SPF processes by the SPF funded communities may contribute to successes in the prevention efforts in those communities.

Research Question 3: Factors That Explain the Changes in Outcomes

The results suggest that the characteristics most strongly related to favorable changes were: having a clear vision and focus, having a broad-based and diverse membership, having a sufficient internal structure, monitoring follow-through, key partners in the community, community groups targeted for raising awareness, use of multiple communication channels to raise awareness, and having funding from sources other than the SPF SIG. These attributes suggest the importance of organizational structure, connections with other community organizations, and community outreach.

Chapter 5: Discussion, Conclusions, and Recommendations

Discussion

Research Question 1: Implementation Fidelity

An overall analysis of implementation fidelity was previously performed in general for all 26 grantees from the first two cohorts of the SPF SIG recipients (unpublished study, 2014). A more detailed evaluation of implementation fidelity was performed on data collected from two states, Vermont and Washington, using the same method as the one for overall analysis. Implementation at all the steps of the SPF processes were scored from 1 through 3, one being a low implementation score, 2 being an adequate level score, and 3 being the high level of implementation. Any score of 2 or better was accepted as a passing score.

The cross site evaluation team conducted a series of implementation surveys on all SPF SIG grantees through a third round (R3) of interviews approximately one year after the SPF SIG ended. Although the interviews were abbreviated because the grants were over, data collection in R3 surveys were similar to R1 and R2. Results of the R3 data collection essentially noted that the efforts started by the grantees were sustained even 1 year after the end of the program (Edwards et al., 2015).

From the process point of view, state evaluators agreed that SPF effects were sustained and attributed the SPF process to a positive contribution to their prevention efforts beyond the extent of the SPF SIG grant. The grantees, in general, noted that they now have a solid foundation for an effective program planning process, have overall

awareness of the importance of a data driven process, and have capacity building among the community partners.

Research Question 2: Changes In Outcomes Data Due to SPF Implementation

An analysis of the associations between SPF implementation and reductions in underage drinking was performed on data submitted by communities in the study states. A majority of communities in Vermont (22 out of 24 communities) reported a decrease in the past 30-day alcohol use by ninth to 12th graders, with the average use rate decreasing from 41.8% to 35.8%, over the 4 years of SPF implementation at the community level. In Washington state, eight of the 12 community partners saw a decrease in the percent of students in Grade 8 who reported any alcohol use in the past 30 days from the pre- to post-intervention period. There was a 3% decrease from 22.7% during the preintervention period to 19.7% during the postintervention period. This may not be statistically significant considering the small sample size; nevertheless, there was a decrease over the implementation period.

Since the results of the study on implantation fidelity in both Vermont and Washington states showed that their communities implemented SPF process satisfactorily and communities in both states showed improvements in the outcome measures used to track the implementation, it can be said that faithful implementation of SPF processes by the SPF funded communities may contribute to successes in the prevention efforts in those communities.

Research Question 3: Factors That Explain the Changes in Outcomes

Scores for all implementation measures from pre- and post-implementation exhibited favorable changes. Outcome changes calculated for all communities that provided requisite data showed an overall decrease of prevalence of current alcohol drinking of 2.9%. Although degrees of changes are moderate, there were positive correlations between changes in the community organizational structure and implementation and the reduction of prevalence of alcohol use among adolescents. Of the 32 associations between implementation and outcomes examined, 29 were positive. Therefore, the evaluation of implementation of SPF showed that there are consistent patterns of positive associations between implementation of SPF and larger decreases in the outcome.

The results suggest that the characteristics most strongly related to favorable changes were having a clear vision and focus, having a broad-based and diverse membership, having a sufficient internal structure, monitoring follow-through, having key partners in the community, having community groups targeted for raising awareness, using multiple communication channels to raise awareness, and having funding from sources other than the SPF SIG. These attributes suggest the importance of organizational structure, connections with other community organizations, and community outreach.

Interpretation of the Findings

Both Vermont and Washington state have implemented the SPF with fidelity as prescribed by the model. Communities in Vermont demonstrated a statistically significant

improvement of community level outcomes in relation to their peer comparison communities. While Washington state demonstrated a decrease in pre- and post-outcomes, the decrease was not statistically significant. Results from Washington also failed to show that the improvement in outcomes was correlated with implementation fidelity since the outcomes of targeted communities were not significantly different from that of improvements in comparison communities.

Some of the factors that stand out as related to these improvements were having a clear vision and focus, having a broad-based and diverse membership, having a sufficient internal structure, monitoring follow-through, having key partners in the community, using multiple communication channels to raise awareness, and having funding from sources other than the SPF SIG. These attributes suggest the importance of organizational structure, connections with other community organizations, and community outreach.

Sustainability of Core Functions of SPF

The national cross site evaluation team surveyed evaluators of the grantees 1 year after the end of the first two cohorts of the SPF SIGs (Edwards et al., 2015). They found that the capacity of prevention infrastructure continued to improve 1 year after the grants ended (Edwards et al., 2015). Another important finding to note in reference to sustainability is that Wyoming SPF SIG, one of the first cohort grantees, reported that their outcomes improved significantly after the end of their SPF SIG implementation even though they were not able to show any improvement in outcomes during the implementation period (Wyoming Survey and Analysis Center, 2011).

Overall, the results of this small study presented here suggest that communities in the states of Vermont and Washington implemented SPF as intended by CSAP. The process and outcomes data showed that implementation of SPF brought about the desired outcomes for these communities. Evaluators from Vermont and Washington acknowledged that SPF worked for their prevention efforts and made considerate efforts to sustain this framework into their state prevention systems. This has great implications since such findings suggest that SPF can have a lasting impact on state prevention capacity.

It is important to note that the SPF SIG program is on-going, and the cross site evaluation project is still collecting data on other cohorts in the program. Although the SPF SIG program has evolved over the years, the overarching principles of the SPF model is sustainability, and those involved in cross site evaluation have attempted to maintain the integrity of the core functions of the program and the comparability of data collected across all cohorts of grantees. The demonstrated benefits that the first two cohorts of SPF SIGs reaped can be sustained through the rest of the cohorts of SPF SIGs must wait for the conclusion of evaluation of all cohorts.

Limitations of the Evaluation

There are many challenges to such evaluation studies. As stated previously, these challenges are not just limited to the evaluation of substance prevention programs. Issues with data quality, missing data, losses to follow-up, and data linkage problems occur across multiple public health disciplines (Alciati & Glanz, 1996; Amaro et al., 2005). Because much of the process evaluation requires the collection of qualitative data, the

national evaluation team carefully planned to ensure the reliability in coding across all process data collected without bias.

Due to the inability to require a strict implementation of the framework and flexibility built into the steps, many limitations are inevitable. The majority of the SPF SIG grantees in the initial cohort had difficulties during the initial stages of the program and required up to 3 years before the implementation of the program (Step 4) could begin. These limitations are particularly relevant for activities pertaining to the assessment step and other initial stages of the project because of the possibility for recall bias.

Another possible limitation to this kind of observational study extrapolation of impact is from small group sizes. As illustrated in this study, many prevention programs are delivered to a small number of communities, and these communities, in turn, provided interventions to small groups of program participants. These situations may not provide the types of achievements that can show significant impacts on population-level indicators. It may take a compilation of many similar results from the problems communities addressed and their consequences produced by implementation by grantee communities to move needles at the population level. Some of the other on-going challenges include that of subjectivity of self-report as opposed to direct measurement and reporting over time (Greenlund et al., 2005).

Barriers to SPF implementation often go beyond data issues. Internal disagreements on policy issues play important roles in implementation. Workforce development issues such as the lack of skills in data use and reluctance to embrace new

technology can hinder the process. Political pressures, lack of clarity in directions, and differing interpretations of rules and regulations are some of the examples of barriers to effective implementation.

Some of these challenges were due to circumstances not under the control of program developers or the evaluators. For example, the Performance Assessment Measuring Tool was instituted by the Office of Management and Budget and all federal programs were to report using the Performance Assessment Measuring Tool for FY2005. This was after CSAP had awarded the first cohort of SPF SIG grants in 2004. Another factor that was not under anyone's control was the economic downturn of 2008. Many state and local program suffered cuts due to a lack of funds. Some curtailed the data collection activities, such as state and local level behavioral factor assessment surveys that contained vital items needed to report on the progress of SIF SIG programs.

As mentioned earlier, some of these challenges considered by the national evaluation team were, in part, due to the design of the SPF SIG program. Since the SPF SIG program was designed to demonstrate the uses of the SPF framework, ample flexibility was built into the program. Some of the flexible aspects of the program included freedom to choose individual indicators to measures community level outcomes, freedom for states to choose method of selecting communities to fund, and freedom to choose EBPPP to implement in their communities. Therefore, some challenges of evaluation from the onset were related to the lack of matched comparison communities and adequate outcome data to compare across communities. Both Vermont and Washington state have missing values on key variables. For example, some community

fidelity scores and posttest intervening variables were missing, neither of which were mandatory to collect or submit.

Finally, it is important to point out the inherent challenge of this study due to the limited breadth of capacity of a dissertation project. The study is on a very limited and a very small segment of a large project involving five cohorts of grantees over a long period of time. Characteristics of the first two cohorts and the rest of the cohorts changed significantly since CSAP added five Native American (NA) Tribal entities starting with Cohort III grantees, six tribal entities in Cohort IV, and seven tribes in Cohort V of SPF SIGs. The addition of the NA entities introduced complexity to cross site evaluation since many exceptions in data collections were provided to NA tribes to accommodate their unique needs. Also, many of these NA entities were single community grantees. Thus, the distinctions between state-level grantees and community partners required adjustments. Although the cross site evaluation of subsequent cohorts is not part of this particular study, changes in the make-up of the SPF SIG grantees may complicate the comparability of results, and the generalizability of the interpretation of findings across all cohorts of SPF SIGs may be called into question.

Recommendations

The recommendations for action as a result of this study are basically three-fold. One is from a programmatic perspective, the second from a data analysis perspective, and the third from the application of learned knowledge to the future of substance misuse prevention.

First, SPF has been shown to be effective in reducing and preventing behavioral problems such as substance misuse in young people when implemented with fidelity. Therefore, it is recommended that SPF be among the top endorsed models of framework for planning prevention programs at communities across the United States. The fact that major systems such as CTC and PROSPER have been using SPF as their framework is worth noting for the purpose of recommending SPF.

Second, it is recommended that data sets containing the results from all subsequent cross site evaluation studies of the rest of the cohorts of the SPF SIG grantees be deposited into similar archives as the first two cohorts of SPF SIGs. The data from the cross site evaluation of the first two cohorts were deposited into ICPSR to be used by researchers. These data sets are packed with rich data, and they are made available for any researchers interested in studying behavioral changes garnered over several years of longitudinal studies.

The contract to collect and deposit the cross site evaluation data sets for the first two cohorts ended in 2013, and there is no equivalent production and deposition of data for the subsequent cohorts at this time. While a substantial body of literature that addresses the subject exists, the detailed data collection through thoughtful collaborative efforts such as this data set on the cross site evaluation of SPF is a hidden asset that should not be lost to follow-up.

The third recommendation is to extend the knowledge that was gleaned from the results of this study to broader application across the field of the prevention of substance misuse. This study was performed on only two states because of the limited breath of

work primarily designed for a doctoral dissertation. However, there is a demonstrated need to expand the study to all states and jurisdictions that implemented the SPF and apply what was learned from such a wide-ranging study of the prevention of alcohol misuse by adolescents to the broader field of substance use prevention.

There is currently an explosion of morbidity and mortality due to opioid misuse (CDC, 2011; Clement & Bernstein, 2016; Frenk, Porter, & Paulozzi, 2015), and opportunities to stop the explosion of such negative public health trends are available by using knowledge learned here. Changes of behavioral risk factors to positively influence alcohol misuse can be applied to other current challenges such as opioid use. The case can be further made for using this as an example for bringing about positive social change through the application of knowledge learned from the study.

Implications for Social Change

"Social change" is defined by the Encyclopedia Britannica (social change. (2016) in *Encyclopædia Britannica r*etrieved from https://www.britannica.com/topic/social-change) as "the alteration of mechanisms within the social structure, characterized by changes in cultural symbols, rules of behavior, social organizations, or value systems." There are examples of major social changes, such as the Industrial Revolution, Emancipation Declaration, Equal Rights Movement, etc. However, social changes may be brought about through a series of small but significant changes in behavioral patterns over time.

Since one of the goals of this study was to provide a framework for behavioral changes in adolescent behavior, the study has many major implications for social change.

The Strategic Prevention Framework represents a model for bringing about social changes systematically and logically. Unlike many common prevention systems, the Strategic Prevention Framework introduces (a) an approach solidly based on theoretical foundations; (b) data driven model of planning prevention interventions; and (c) utilization of evidence based policies and practices. With these highlights in mind, the results of this study contributes to scientific understanding of multifaceted nature of behavioral issues in adolescents and application of that knowledge base to planning more effective prevention strategies. That, in turn, will promote positive social change in healthier communities.

The use of comprehensive and overarching data collection over several years and systemic analysis of that data can also contribute to overall social change. Exploration of methods of evaluation used in this study could point to further systemization of examining effectiveness of operating systems such as SPF. This may have methodological implications in social changes by introducing data driven planning process and utilization of evidence-based programs in order to promote improvements in behavioral health.

Finally, social change implication of operating systems such as SPF can be demonstrated my review of recent development of increase in marijuana use (Caulkins, Hawkens, Kilmer, & Kleiman, 2012), opioid misuse (Frenk, Porter, & Paulozzi, 2015) and epidemic of soring mortality due to heroin overdose (Murthy, 2016). Application of readily available knowledge and proven effectiveness for underage drinking of framework such as SPF should be considered when developing and planning strategies to

prevent use of marijuana in adolescents and reducing misuses of prescription drugs and mortality due to opioid overdoses.

Conclusion

Analysis of the associations between implementation of SPF and reductions in underage drinking was performed on communities that targeted underage drinking. Evaluation of the data on implementation of SPF showed that there are consistent patterns of positive associations between implementation of SPF and larger decreases in underage drinking over time.

The results suggest that the characteristics most strongly related to favorable changes were: having a clear vision and focus, having a broad-based and diverse membership, having a sufficient internal structure, monitoring follow-through, key partners in the community, community groups targeted for raising awareness, use of multiple communication channels to raise awareness, and having funding from sources other than the SPF SIG. These attributes suggest the importance of organizational structure, connections with other community organizations, and community outreach.

The findings presented here illustrate the existence of an operating system that can be proven to be effective. Implementation of SPF produced desirable changes by targeting substance abuse behaviors. Communities used data driven planning framework and such frameworks can also serve as models for bringing about behavioral changes in many facets of social settings.

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Appendix A: Implementation Fidelity Users Guide

Assessing the Fidelity of Implementation of the Strategic Prevention Framework in SPF SIG-funded Communities

User's Guide

and

Fidelity Assessment Rubrics

(Version 2)

4/30/2008

Appendix B: Implementation Scores by SPF Steps

1. Vermont Step 1 Implementation Scores by communities

Comm ID	Domain 1	2	3	4	5	7	8
163	3	2.33	2.33	3	2.67	2.33	2.67
164	3	2	2	2.33	2	2	1
165	3	2.33	2.67	3	2.67	2.33	3
166	2.67	2	2	2	2.33	2	1.67
168	3	2.33	2.67	2.67	2.67	2	2.67
173	2	2	2	1.67	1.67	1	2
174	3	2.33	2	3	2	2	3
175	2.67	1.67	1.67	2	2.33	1.67	2
176	2.67	1.67	2	2	1.67	2.33	2
177	3	2.33	2.33	3	2	2.33	2.67
178	3	2.67	2.67	2.67	2.33	2.33	2
179	2.67	1.67	2	1.67	1.67	2	1.67
180	3	2.33	2.33	3	2.33	2.33	2.33
181	3	2.33	2.33	2.33	2.33	2.33	2.33
182	3	2.67	3	3	2.67	2.67	2.67
183	3	2.33	2.67	2.67	2.67	2.33	2.33
184	2.67	2	2.33	2.33	2	1.67	2.67
185	2	1.67	1.67	2	2.33	2.33	1.67
186	2.67	2.33	2.33	2.67	2	2.33	2
187	3	2.33	2.67	2.67	1.67	2.67	3
188	3	2.33	2.67	2.67	2.33	2.33	1.33
189	3	2	2.33	1.67	1.67	2.33	2.67
190	3	2	2	1.33	2	2.33	0
191	2.67	2	1.67	1.67	2	2.33	1
	2.75	2.15	2.29	2.44	2.28	2.37	2.33

2. Washington Step 1 Implementation Scores by communities

Comm ID	Domain 1	2	3	4	5	6	7	8
121	2.5	2.5	2	3	2.5	2	2.5	2.
122	3	3	2	2.5	3	2.5	2.5	3
123	2	2	2	3	3	1.5	1	2
124	1.5	1.5	2.5	2.5	2.5	1.5	1.25	2
125	1	2	2	3	3	2.5	2	1.5
126	2	2	2	2	2.5	2	2	1.5
127	3	2.5	2	2.5	2.5	2.5	2.5	1.5
128	3	2.5	3	2.5	2.5	2.5	2.5	3
129	3	3	1.5	3	3	2	2	2
130	2.5	3	2.5	3	3	2	2	2.5
131	3	2.5	2.5	2	2.5	2	2.5	2
	2.41	2.41	2.18	2.64	2.73	2.09	2.07	2.14

3. Vermont Step 2 Implementation Scores by communities

Comm ID	Domain 1	3	5	6	7	9
163	1.75	1.5	1.33	1.25	3	2
164	2	1	2	1.5	1.75	2
165	2	1.5	2.67	2	2.75	1.75
166	1.75	1.75	2.33	1.5	2.5	1.75
168	1.75	1.75	2	1.5	2.5	2
173	1.5	1.25	1.33	1	2.25	1.5
174	1.75	1.25	2	1	2.5	2
175	1	1	2.33	1	2.5	2
176	1	1	2.67	1.5	2.5	1.5
177	2.25	1.75	2.67	1	3	1.75
178	2	2	1.67	1.5	2.5	1.25
179	1.5	1.5	2	1.5	2.25	1.5
180	1.75	1.25	2	2	2.5	2
181	1	1.5	1.67	1.5	2.5	1.5
182	1.75	1.75	1.67	1	3	2.25
183	1.75	1.75	1.67	1.5	2.5	1.5
184	1.75	1.75	1.33	1.5	2.25	1.5
185	2	2	2	1	2.25	2
186	2	1.5	3	1	2.5	1.25
187	1.25	1.75	2.33	1	2.5	1.5
188	1.5	1.75	2.67	1	2.5	1.25
189	2	1.25	2.33	1.5	2.5	1.25
190	2	2	2	1	2.25	2
	1.70	1.54	2.07	1.32	2.49	1.70

4. Washington Step 2 Implementation Scores by communities

Comm ID	Domain 1	2	3	4	5	6	7	8	9
121	2	2.5	2	2	2.5	1	1.5	3	2
122	3	2	2	3	3	2	2.5	3	2
123	1.5	1	1	1	1.5	1.5	1.5	1	1.5
124	1	1	1	1	1	1	2	2	1
125	2	2	1	1.5	1.5	1.5	2.5	2	1.5
126	2	1.5	1.5	2	2	1	2	1.5	2
127	3	2.5	1	1.5	2.5	1.5	2	2.5	2
128	2	2	2	2	3	1	2.5	3	2
129	2	1	2	1	1	1	1.5	2	1
130	1	2	2	1	1	1	2	2	2
131	2	2	2	2	3	1	2.5	2	2
132	2.5	1.5	1	1.5	1.25	1.5	1.5	2	2
	2.0	1.75	1.54	1.63	1.94	1.25	2.0	2.17	1.75

5. Vermont Step 3 Implementation Scores by communities

	Domain							
Comm ID	1	2	3	4	5	6	7	8
163	2	2.75	3	2	2.75	2	2.5	2.25
164	2.25	2.25	1.75	2	2	1.5	1.25	1.25
165	1.25	3	3	3	2.5	1.5	2.75	3
166	1.25	1.5	1.25	2	1.25	2	1.25	1.5
168	2.5	2	2.75	2	2	2.75	1.25	3
173	1	1.25	1	1	1.5	1.75	1.25	1.75
174	2.75	2.25	2	2	2	1.5	2.75	1
175	2.75	2.5	2.25	1.75	1.75	2.75	1.75	2
176	1.5	2.25	2.25	1.5	1.25	1	1.75	1.75
177	1	2.5	3	2.5	2	1.75	2	1.25
178	2.25	2.25	2.5	2.5	1.75	3	2.75	2.75
179	2.25	2.25	1.75	2	1.5	2	1.5	2.5
180	1.25	3	3	2.25	2.25	2	1.75	2
181	2.25	2.5	2.75	1.25	2	1.5	2	1.75
182	2.75	2.75	2.5	2.25	3	2.25	2.75	2.75
183	1.75	2.25	2.5	1.75	2.5	1.75	2	2
184	2	2.5	2	1.25	2	1.75	1.5	2
185	2.5	1.5	2	1.5	2.5	1.75	1.5	1.5
186	2.5	2.25	1.75	2	2.5	2.25	1.75	1.75
187	2	2.25	1.75	1.75	2.75	2.5	2.5	1.5
188	1.5	2.75	2.25	1.25	2.5	2.25	2.5	2.5
189	2	2.25	2.25	1	2	1	1.75	1
190	1.25	2.5	2.5	1.5	1.75	1.5	1.75	1.5
191	1.75	2	2	2	2	2.5	1.25	1.75
	1.93	2.30	2.24	1.83	2.08	1.94	1.91	1.92

6. Washington Step 3 Implementation Scores by communities

Comm ID	Domain 1	2	3	4	5	6	7	8
122	3	3	3	3	3	2	3	3
123	1.5	1.5	1.5	1	2.5	1.5	1.5	2
124	1.5	2.5	2	1	2.5	3	3	1
125	1.5	2.5	2.5	2	3	2.5	2.5	2.5
126	2.5	3	2.5	2.5	2.5	3	2.5	2.5
127	2.5	3	2.5	3	2.5	2.5	2.5	3
128	2.5	3	3	3	2.5	3	2.5	2
129	1.5	2.5	2	1	2.25	-8	3	1
130	2.5	2.5	2.5	1	2.5	3	2.5	1
131	2.5	3	2.5	3	2	3	2.5	2
132	1.5	2.5	2.5	3	2.5	2.5	2.5	2
121	3	3	3	2.5	2.5	2.5	2	2.5
	2.17	2.67	2.46	2.17	2.52	1.71	2.5	2.04

7. Vermont Step 4 Implementation Scores by communities

Comm ID	Domain					
	1	2	3	4	5	6
163	2.25	2.75	2.25	2.25	2	1.5
164	2.25	2.25	2.25	2	1.75	1.25
165	3	2.5	3	3	2.25	2
166	1.75	1.25	1.75	1.25	1	1.5
168	1.75	1.75	1	1	1.25	1
173	1.5	1.25	1	1	1	1
174	2.75	2.25	1.75	2	2	2.25
175	2.25	2.25	1.75	2	2	2
176	2.25	2	1.75	2	1.75	1.25
177	3	2.5	3	3	2.5	2.5
178	1.25	1.25	1	2	1.25	1
179	2	2	1.75	1.25	1	1
180	2.25	2	2	2.25	2	1.75
181	1.75	1.75	1	1	1	1
182	2.75	2.25	1.75	2.25	1.75	1
183	2	2	2	1.75	1.25	1
184	2.5	2.25	1	1	1	1
185	2.25	2.25	1.25	1	1	1
186	2.75	3	2	2.25	1.75	2
187	2.25	2.25	2	2.75	2	2.25
188	2.5	2.75	3	2.5	2.5	2.5
189	2	2	1.75	1.75	1.75	1
190	2.75	2.25	1	2	2	1.25
	2.25	2.12	1.78	1.88	1.64	1.48

8. Washington Step 4 Implementation Scores by communities

	Domain					
Comm ID	1	2	3	4	5	6
121	2	3	3	3	1.5	2
122	3	3	3	3	3	3
123	2	1.5	2	1	2	1.5
124	3	2.5	3	2	1.5	2.5
125	2.5	3	3	1.5	2	2.5
126	3	3	3	3	3	1.5
127	3	3	3	2	2	2
128	3	3	3	3	3	3
129	2.5	1.5	3	2	2	1
130	2	2	3	2	3	3
131	2.5	2.5	3	3	2	2
132	2.5	2.5	2.5	2	2.5	1.5
	2.58	2.54	2.88	2.29	2.29	2.13

9. Vermont Step 5 Implementation Scores by communities

Comm ID	Domain 1	4	5	10
163	3	2.25	1.75	1.75
164	3	2.25	1.75	2.25
165	3	1.75	1.5	1.5
166	3	2	1.75	1.75
168	2.5	2	1.75	2
173	3	2	1.75	2
174	2	1.5	1.25	1.75
175	2.25	1.5	1.25	1.75
176	3	3	2	2
177	2.25	1.75	2	2
178	2	1.25	1.75	1.75
179	3	2.75	2.5	3
180	3	2	1.75	1.75
181	2	1.75	2	2
182	2.75	2	1.75	2
183	3	1	2.5	2
184	3	2.75	2	2
	2.69	1.97	1.82	1.96

10. Washington Step 5 Implementation Scores by communities

	Domain									
Comm ID	1	2	4	5	6	7	8	9	10	11
121	2.5	3	3	2.5	1.5	2.5	2	1.5	1	2
122	3	3	3	2.75	2.75	3	3	2.5	2	1.5
123	2.5	3	2	2.5	2	2.5	2	1.5	2	1.5
124	3	3	2.5	2.25	2.75	3	2.5	2	1.5	1.5
125	3	3	2	2.5	1	3	2.5	2	1	2
126	3	3	2.5	2.5	1.5	3	2.5	2	2	3
127	3	3	2.5	3	2	3	2.5	1.5	1.5	2.5
128	3	3	3	2.75	2.75	3	2.5	1.5	2	2
129	2.5	3	2.5	2.25	1.25	3	2.5	1.5	1.5	1.5
130	3	3	2.5	2.25	2.25	3	2.5	1.5	2	1.5
131	3	3	3	2.75	1.75	3	2.5	1.5	1.5	2
132	2.5	3	2	2	2	2.5	2	1.5	1.5	1.5
	2.83	3.00	2.54	2.50	1.96	2.88	2.42	1.71	1.63	1.88

Appendix C: Community Level Instruments

CLI Crosswalks_OMB (3-27-06)

Q#	Qx Text	Logic Model Code	Logic Model Component	SPF-SIG 5 Steps Codes	SPF-SIG 5 Steps	Other Themes	Domain	Construct
1	Name of the intervention	9	Community Level: Planning & Implementation	4	Implement evidence-based prevention programs, policies, and practices	n/a	Intervention Form/Intervention Information	intervention name
2	When did you begin funding this intervention?	9	Community Level: Planning & Implementation	4	Implement evidence-based prevention programs, policies, and practices	n/a	Intervention Form/Intervention Information	intervention funding start date
3	When did you complete implementing this intervention?	9	Community Level: Planning & Implementation	4	Implement evidence-based prevention programs, policies, and practices	n/a	Intervention Form/Intervention Information	intervention funding end date
4	What factors, beyond data driven planning, influenced your intervention selection? _" Local capacity to deliver interventions " _ Cost " _ Experience implementing intervention prior to SPF SIG funding " _ Political environment " _ Requirements of partnering organizations " _ Evidence-based literature on effectiveness " _ Other information supporting the effectiveness of the intervention " _ Demographics or cultural characteristics of local population " _ Availability of technical assistance " _ Recommendation by state funding agency " _ Other (Describe.)	9	Community Level: Planning & Implementation	4	Implement evidence-based prevention programs, policies, and practices	n/a	Intervention Form/Intervention Information	factors influencing intervention selection
5	Is this an evidence-based program, policy or practice? _ Yes " _ No (If no, proceed to question 7.)	9	Community Level: Planning & Implementation	4	Implement evidence-based prevention programs, policies, and practices	n/a	Intervention Form/Intervention Information	evidence-based intervention

Appendix D: State Level Instrument – Infrastructure Survey

Form Approved
OMB No. 0930-0279
Expiration Date 09/30/2009

STATE INFRASTRUCTURE INTERVIEW PROTOCOL

SPF SIG NATIONAL CROSS-SITE EVALUATION

DATE: |___|___| / |___|___| / |___|___|___|___|

INTERVIEWER NAME:_____

RESPONDENT NAME:_____

RESPONDENT TITLE/POSITION:_____

RESPONDENT ORGANIZATION ALFFILIATION:_____

STATE: |___|___|

Appendix E: State Level Instrument – Implementation Survey

Form Approved
OMB No. 0930-0279
Expiration Date 09/30/2009

STRATEGIC PREVENTION FRAMEWORK (SPF) IMPLEMENTATION INTERVIEW PROTOCOL

SPF SIG NATIONAL CROSS-SITE EVALUATION

DATE: |___|___| / |___|___| / |___|___|___|___|

INTERVIEWER NAME:_____
_____

RESPONDENT NAME:_____
_____

RESPONDENT TITLE/POSITION:_____
_____

RESPONDENT ORGANIZATIONAL AFFLIATION:_____

STATE: |___|___|

INTERVIEW START TIME: |___|___| : |___|___|

Appendix F: Critical Values of Student's *t* Distribution With *v* Degrees of Freedom

ν	0.90	0.95	0.975	0.99	0.995	0.999
1.	3.078	6.314	12.71	31.821	63.657	318.31
2.	1.886	2.920	4.303	6.965	9.925	22.327
3.	1.638	2.353	3.182	4.541	5.841	10.215
4.	1.533	2.132	2.776	3.747	4.604	7.173
5.	1.476	2.015	2.571	3.365	4.032	5.893
6.	1.440	1.943	2.447	3.143	3.707	5.208
7.	1.415	1.895	2.365	2.998	3.499	4.782
8.	1.397	1.860	2.306	2.896	3.355	4.499
9.	1.383	1.833	2.262	2.821	3.250	4.296
10.	1.372	1.812	2.228	2.764	3.169	4.143
11.	1.363	1.796	2.201	2.718	3.106	4.024
12.	1.356	1.782	2.179	2.681	3.055	3.929
13.	1.350	1.771	2.160	2.650	3.012	3.852
14.	1.345	1.761	2.145	2.624	2.977	3.787
15.	1.341	1.753	2.131	2.602	2.947	3.733
16.	1.337	1.746	2.120	2.583	2.921	3.686
17.	1.333	1.740	2.110	2.567	2.898	3.646
18.	1.330	1.734	2.101	2.552	2.878	3.610
19.	1.328	1.729	2.093	2.539	2.861	3.579
20.	1.325	1.725	2.086	2.528	2.845	3.552
21.	1.323	1.721	2.080	2.518	2.831	3.527
22.	1.321	1.717	2.074	2.508	2.819	3.505
23.	1.319	1.714	2.069	2.500	2.807	3.485
24.	1.318	1.711	2.064	2.492	2.797	3.467
25.	1.316	1.708	2.060	2.485	2.787	3.450
26.	1.315	1.706	2.056	2.479	2.779	3.435
27.	1.314	1.703	2.052	2.473	2.771	3.421
28.	1.313	1.701	2.048	2.467	2.763	3.408
29.	1.311	1.699	2.045	2.462	2.756	3.396
30.	1.310	1.697	2.042	2.457	2.750	3.385
31.	1.309	1.696	2.040	2.453	2.744	3.375
32.	1.309	1.694	2.037	2.449	2.738	3.365
33.	1.308	1.692	2.035	2.445	2.733	3.356
34.	1.307	1.691	2.032	2.441	2.728	3.348
35.	1.306	1.690	2.030	2.438	2.724	3.340
36.	1.306	1.688	2.028	2.434	2.719	3.333
37.	1.305	1.687	2.026	2.431	2.715	3.326
38.	1.304	1.686	2.024	2.429	2.712	3.319
39.	1.304	1.685	2.023	2.426	2.708	3.313
40.	1.303	1.684	2.021	2.423	2.704	3.307
41.	1.303	1.683	2.020	2.421	2.701	3.301
42.	1.302	1.682	2.018	2.418	2.698	3.296
43.	1.302	1.681	2.017	2.416	2.695	3.291
44.	1.301	1.680	2.015	2.414	2.692	3.286
45.	1.301	1.679	2.014	2.412	2.690	3.281
46.	1.300	1.679	2.013	2.410	2.687	3.277
47.	1.300	1.678	2.012	2.408	2.685	3.273
48.	1.299	1.677	2.011	2.407	2.682	3.269
49.	1.299	1.677	2.010	2.405	2.680	3.265

50.	1.299	1.676	2.009	2.403	2.678	3.261
51.	1.298	1.675	2.008	2.402	2.676	3.258
52.	1.298	1.675	2.007	2.400	2.674	3.255
53.	1.298	1.674	2.006	2.399	2.672	3.251
54.	1.297	1.674	2.005	2.397	2.670	3.248
55.	1.297	1.673	2.004	2.396	2.668	3.245
56.	1.297	1.673	2.003	2.395	2.667	3.242
57.	1.297	1.672	2.002	2.394	2.665	3.239
58.	1.296	1.672	2.002	2.392	2.663	3.237
59.	1.296	1.671	2.001	2.391	2.662	3.234
60.	1.296	1.671	2.000	2.390	2.660	3.232
61.	1.296	1.670	2.000	2.389	2.659	3.229
62.	1.295	1.670	1.999	2.388	2.657	3.227
63.	1.295	1.669	1.998	2.387	2.656	3.225
64.	1.295	1.669	1.998	2.386	2.655	3.223
65.	1.295	1.669	1.997	2.385	2.654	3.220
66.	1.295	1.668	1.997	2.384	2.652	3.218
67.	1.294	1.668	1.996	2.383	2.651	3.216
68.	1.294	1.668	1.995	2.382	2.650	3.214
69.	1.294	1.667	1.995	2.382	2.649	3.213
70.	1.294	1.667	1.994	2.381	2.648	3.211
71.	1.294	1.667	1.994	2.380	2.647	3.209
72.	1.293	1.666	1.993	2.379	2.646	3.207
73.	1.293	1.666	1.993	2.379	2.645	3.206
74.	1.293	1.666	1.993	2.378	2.644	3.204
75.	1.293	1.665	1.992	2.377	2.643	3.202
76.	1.293	1.665	1.992	2.376	2.642	3.201
77.	1.293	1.665	1.991	2.376	2.641	3.199
78.	1.292	1.665	1.991	2.375	2.640	3.198
79.	1.292	1.664	1.990	2.374	2.640	3.197
80.	1.292	1.664	1.990	2.374	2.639	3.195
81.	1.292	1.664	1.990	2.373	2.638	3.194
82.	1.292	1.664	1.989	2.373	2.637	3.193
83.	1.292	1.663	1.989	2.372	2.636	3.191
84.	1.292	1.663	1.989	2.372	2.636	3.190
85.	1.292	1.663	1.988	2.371	2.635	3.189
86.	1.291	1.663	1.988	2.370	2.634	3.188
87.	1.291	1.663	1.988	2.370	2.634	3.187
88.	1.291	1.662	1.987	2.369	2.633	3.185
89.	1.291	1.662	1.987	2.369	2.632	3.184
90.	1.291	1.662	1.987	2.368	2.632	3.183
91.	1.291	1.662	1.986	2.368	2.631	3.182
92.	1.291	1.662	1.986	2.368	2.630	3.181
93.	1.291	1.661	1.986	2.367	2.630	3.180
94.	1.291	1.661	1.986	2.367	2.629	3.179
95.	1.291	1.661	1.985	2.366	2.629	3.178
96.	1.290	1.661	1.985	2.366	2.628	3.177
97.	1.290	1.661	1.985	2.365	2.627	3.176
98.	1.290	1.661	1.984	2.365	2.627	3.175
99.	1.290	1.660	1.984	2.365	2.626	3.175
100.	1.290	1.660	1.984	2.364	2.626	3.174
∞	1.282	1.645	1.960	2.326	2.576	3.090