Improving Identification of Adolescents at Risk for Substance Use Disorders

Julia M. Crouch

University of Missouri Kansas City

Approved May 2017 by the faculty of UMKC in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice

Abstract

The American Academy of Pediatrics recommends screening adolescent patients for drug and alcohol use following a standardized process and utilizing a developmentally appropriate screening tool. The purpose of the evidence based project was to identify adolescents at risk for substance use disorders; addiction beginning in adolescence is a predictor of addictive disorders in adulthood and is associated with significant morbidity and mortality in teens. This project involved an evidence based intervention for 12 to 18-year-olds to improve identification of adolescent patients at risk for substance use disorders, using the screening, brief intervention, and referral to treatment process and the CRAFFT screening tool over a three-month period at a pediatric primary care clinic. The project used a quasi-experimental, two group, prospective design with convenience sampling for the intervention group and retrospective chart reviews for the baseline group. The sample size was 70 with 35 patients from the baseline group and 35 patients who presented for preventative care at the pediatric clinic in a community health center in Missouri. The CRAFFT screening tool was given to eligible patients to complete before being seen by a provider. Patients scoring greater than or equal to two on the six-item questionnaire were considered *high risk* for substance use disorders and were appropriately referred. The number of patients referred for substance use disorders pre-intervention was compared to the number referred post-intervention. Results showed a marginal improvement in substance abuse identification between the intervention and baseline group. Using a standardized process and screening tool to identify teens who have experimented with drugs and alcohol allows providers to intervene before serious addiction occurs.

Keywords: adolescent substance use, adolescent substance use screening tool, CRAFFT screening tool, SBIRT, primary care

Improving Identification of Adolescents at Risk for Substance Use Disorders

The goal of the evidence based quality improvement (EBQI) project was to screen adolescent patients for substance use which is the first step in the screening, brief intervention, and referral to treatment (SBIRT) process (Subramaniam et al., 2010). Screening may be the most important component of SBIRT because it is the gateway for intervention and referral to treatment (Mitchell et al., 2013). The American Academy of Pediatrics (AAP), the American Medical Association (AMA), and the Substance Abuse and Mental Health Services Administration (SAMHSA) recommend screening patients for substance use and endorse the use of SBIRT (Sterling et al., 2012; Whittle et al., 2015).

This intervention focused on screening adolescent patients, ages 12 to 18 years, using the CRAFFT screening tool (see Appendix A) at a pediatric clinic in Missouri. If patients answered yes to two or more questions on CRAFFT, the screen was considered positive. While identification of high risk patients is the crucial first step, providers must know what to do in the event of a positive screen. The student investigator worked with the pediatric social worker at the project site to appropriately refer patients with a positive screen.

Background

In order to diagnose a substance use disorder, a detailed clinical interview is necessary; however, in the busy primary care setting, this is not feasible (Subramaniam et al., 2013). This information justifies the need for a standardized screening tool in the primary care setting to identify adolescent patients at risk for substance use disorders before adverse health outcomes occur. This topic is of interest because screening tools not only help identify adolescents at risk for complications related to substance use but also aids providers in discussing this sensitive

topic with teens (Berridge, McCann, Cheetham, & Lubman, 2017). Giving providers a standardized tool that is quickly and easily administered may increase the number of teens screened for substance use (Sterling et al., 2015).

Adolescence is a critical period of brain development where dramatic changes in cognitive function occur (Thoma et el., 2011). In the maturing brain, the areas necessary for processing feelings of reward and pain mature before the prefrontal cortex which is responsible for judgment and impulse control (National Institute on Drug Abuse, (NIDA) 2014). These principles can affect a teenager's ability to appropriately weigh the risk and benefits of experimenting with drugs and alcohol (NIDA, 2014).

Addiction beginning in adolescence is highly predictive of substance abuse disorders later in life; early identification of patients at risk for these disorders is imperative (Subramaniam et al., 2010). National reports have shown the earlier an adolescent begins using substances the more likely it is an abuse disorder will develop (NIDA, 2014; SAMHSA, 2012). NIDA (2014) has reported as high as 15.2% of teens who start using alcohol before 14 years of age will develop alcohol abuse or dependence in adulthood as opposed to approximately two percent among those who abstain from alcohol until the age of 21. Consequences of underage substance use range from legal troubles to risk of sexual assault and suicide (Centers for Disease Control and Prevention (CDC), 2016). Long term substance use is also associated with various physical and mental health disorders such as liver disease, cancer, cardiovascular disease, depression, and anxiety (CDC, 2016; Subramaniam et al., 2010).

Significance of Problem

According to a survey of students grade nine through 12 by the United States Department of Health and Human Services (HHS, 2015), 35% reported drinking at least one alcoholic drink in

the past 30 days. In this same age group, seven percent report driving a vehicle after at least one drink while 18% report riding in a vehicle with a driver who had been drinking alcohol (HHS, 2015). Additionally, substance use creates a national economic burden. According to NIDA (2017) the cumulative cost for tobacco, alcohol, and illicit drug use in the United States, is more than $740 billion, accounting for crime, lost work productivity, and health care. While this data is not solely based on adolescents, preventing these disorders before they occur may help alleviate the burden.

Adolescent substance use is a significant problem in society (NIDA, 2017). While screening teens for substance use at preventative care visits is recommended by the AAP, studies have found pediatricians' self-reported screening rates to be as low as 50%, with even fewer reporting the use of a standardized tool (Levy & Williams, 2016). Providers named barriers to screening as insufficient time, lack of training, and being unfamiliar with standardized tools available for screening in this population (Levy & Williams, 2016).

Local Issue

According to a survey by the HHS (2015), 17% of Missouri high school students, grades nine through 12, report drinking alcohol for the first time before 13 years of age. On the same survey, 35% of Missouri adolescents reported having at least one drink of alcohol during the past 30 days which is slightly higher than the national average of 33% (HHS, 2015). Of note, seven percent of Missouri teens reported driving after drinking alcohol and 18% report having ridden in a car with a driver who had been drinking alcohol, both in the last 30 days (HHS, 2015). Drinking and driving as well as riding in a car with an intoxicated driver are topics addressed on the CRAFFT screening tool (AAP, 2011). Another local concern is the lack of standardized

processes and tools for substance use screening. The project site did not have such a process in place for adolescent substance use screening prior to project implementation.

Diversity

The EBQI project was implemented in a pediatric clinic located within a community health center in Missouri. This clinic provides medical, dental, vision, and behavioral health services to a low income, urban core population (personal communication, April 5, 2018). In 2017, 42,140 patients received care at this clinic; of the total patients served, 11.7% received behavioral health services and approximately six percent of patients were homeless (personal communication, April 5, 2018). The majority of patients served at this clinic are African American. Approximately 90% of the patients are insured through Medicaid (personal communication, April 5, 2018). Similar studies, looking at CRAFFT, by Gamarel et al. (2017), D'Amico et al. (2016), and Oesterle et al. (2015), lacked generalizability which was identified as a weakness in the evidence. It will be important to review the diversity of the sample for this project as it represents a weakness in the data.

Problem and Purpose

Problem Statement

The problem statement for the EBQI project follows: Addiction beginning in adolescence is highly predictive of substance abuse disorders later in life therefore early identification of these patients using a standardized screening tool is imperative (Subramaniam et al., 2010). The secondary problem statement is, the pediatric clinic does not have a standardized process or tool for screening adolescent patients for substance use in the pediatric primary care clinic.

Intended Improvement with Purpose

The EBQI project is important because not only does evidence show adolescents in Missouri are using substances but there is not currently a standardized process or tool being used to screen these patients in practice (HHS, 2015). The purpose of the quasi-experimental EBQI project is to determine if using a standardized, developmentally appropriate substance use screening tool (CRAFFT) improves the identification of adolescent patients at risk for substance use disorders in primary care.

Facilitators and Barriers

A pediatric nurse practitioner at the project site was a project facilitator, assisting the student investigator in project implementation. The pediatric social worker in the clinic was also a project facilitator, helping to manage patients who screen positive. Barriers to change included buy-in from the medical assistants and providers. The student investigator promoted change through education as well as adapting the intervention to complement the clinic work flow. The workflow in the pediatric clinic was considered a facilitator. Patients fill out paperwork before clinic visits therefore CRAFFT was simply added to the pre-appointment paperwork. Adapting to the clinic's work flow promoted sustainability of the intervention (Melnyk & Overholt, 2015).

Review of Evidence

Inquiry

In adolescents, 12 to 18 years of age, does the use of a standardized, developmentally appropriate substance use screening tool (CRAFFT) compared to not using a standardized substance use screening tool improve the identification of teens at risk for substance use disorders during a three-month period at one outpatient pediatric clinic?

Search Strategies

PubMed, Cumulative Index of Nursing and Allied Health Literature (CINAHL), and Google Scholar were used to search literature relating to the inquiry. National guidelines from NIDA (2014) and the AAP (2011), on adolescent substance abuse and the SBIRT process, were also used. A total of 48 studies were reviewed with 17 meeting inclusion criteria. Studies published between 2010 and 2018, studies conducted in primary care settings, and studies focusing on the adolescent population (age 12-18 years) met inclusion criteria. Studies conducted at inpatient locations were excluded with the exception of one study conducted at an inpatient psychiatric center. Key search terms, listed from broad to focused, include *adolescent substance use, adolescent substance use screening tools, adolescent substance use screening tools in primary care, SBIRT, adolescent SBIRT* and *CRAFFT* (see Appendix B for definition of terms).

Study Designs

There are a total of 17 publications serving as an evidence foundation for the inquiry (see Appendix C). The breakdown by topic is seven studies on CRAFFT, four studies on adolescent substance use, and six studies on SBIRT. Of these 17 studies, there are three evidence based guidelines, 13 quantitative, and one qualitative. The quantitative studies consist of five cross-sectional designs, three randomized controlled trials, one cohort study, two literature reviews, one case control study, and one controlled trial without randomization. The single qualitative study used an interpretative design with semi-structured interviews.

Level of Evidence

Level of evidence was assigned to each study based on the *Rating System for the Hierarchy of Evidence for an Interventional Inquiry* (see Appendix D; Melnyk & Overholt, 2015, adapted). A total of three evidence based practice guidelines were assigned level I

evidence. Three randomized controlled trials produced level II evidence. Level III evidence was assigned to a controlled trial without randomization and two literature reviews of randomized controlled trials. Seven studies were assigned level IV evidence with five cross-sectional designs, one cohort design, and one case control study. Level VI evidence was assigned to the qualitative study.

Synthesis of Evidence

The three topics related to the inquiry are the CRAFFT screening tool, adolescent substance use, and SBIRT. The CRAFFT screening tool will be used to screen adolescents for substance use; there are seven studies on this topic. Adolescent substance use is the next topic and is necessary to address the *background* and *problem statement*. There are three studies and one evidence based guideline on adolescent substance use. SBIRT is the last topic; it is an evidence based process used in community-based screening to identify, reduce, and prevent substance use (SAMHSA, nd). There are seven studies and two evidence based guidelines on SBIRT.

CRAFFT Screening Tool

The authors of the CRAFFT screening tool recommend using a cutoff score of greater than or equal to two to identify adolescents at risk for substance use (Skogen, Bøe, Knudsen, & Hysing, 2013). Skogen et al (2013) analyzed the sensitivity and specificity of this tool in relation to self-reported outcomes of 9,680 adolescents in Norway. Excessive substance use, frequent binge drinking, illicit drug use, and any combined drug use were the measured outcomes. The cutoff score of greater than or equal to two showed lower sensitivity (0.49-0.61) than a cut off score of one, however it produced higher specificity for every outcome measured (0.82-0.90) (Skogen et al., 2013).

D'Amico et al., (2016) studied psychometric properties of four substance use screening tools in adolescents. Results showed the sensitivity of CRAFFT (0.98) with a cut off score of greater than or equal to two, was higher than the sensitivity of the National Institute on Alcohol Abuse and Alcoholism Screening Guide (NIAAA SG) (0.87), the Personal Experience Screening Questionnaire Problem Severity Scale (PESQ-PS) (0.97), and the Alcohol Use Disorders Identification Test (ADUIT) (0.70) for detecting alcohol use disorders in teens (D'Amico et al., 2016). Subramaniam et al. (2010) also analyzed the psychometric properties of CRAFFT in 23,248 Asian males and found moderate internal consistency (Cronbach's alpha: 0.73) and strong discriminative properties (positive predictive value: 0.02-0.19, negative predictive value: 0.99-1.00) for determining levels of substance abuse, using the same cut off score of greater than or equal to two, in teens.

Reliance on self-reported substance use is one limitation in the studies by Skogen et al., (2013) and Subramaniam et al., (2010). While self-reporting has shown to be reliable; a study conducted at an inpatient psychiatric center was included because CRAFFT scores were compared with objective laboratory measures. Oesterle et al. (2015) collected data from 645 adolescents who completed CRAFFT on admission to a psychiatric facility. A cut off score of greater than or equal to two was used to designate a patient "at risk". Laboratory analysis showed an "at-risk" CRAFFT score (N=248), was positively associated with laboratory confirmation of alcohol (OR=7.47) and marijuana (OR=16.71) use (Oesterle et al., 2015).

CRAFFT was specifically created for adolescents; it is standardized, developmentally appropriate, and the most widely studied screening instrument for substance use in patients under 21 years of age (Alayan & Shell, 2016; AAP, 2011; Pilowsky & Wu, 2013). The CRAFFT

screening tool, at a cut off value of greater than or equal to two, is valid, reliable and out-performs other substance use screening tools in the adolescent population.

Adolescent Substance Abuse

Risk factors for substance use in teens are multifactorial and include genetic vulnerability, parental substance use, dysfunctional family relationships, stressful life events, peer group influence, and psychiatric conditions (Burns et al., 2017). Understanding the motivations behind teen substance use is an important first step in discussing this topic. Smith et al., (2018) conducted a study, assessing the mechanism by which peers influenced risk-taking decisions in adolescents. Smith et al., (2018) studied 28 adolescents, age 15 through 17, who underwent neuroimaging while completing risk-taking tasks performed either alone or in the presence of peers. The results showed activation of reward sensitivity portions of the brain when a peer was present; supporting prior research suggesting peers significantly influence reward processing in risk-taking decisions (Smith et al., 2018).

Early initiation of substance use can have significant effects on physical and mental health (NIDA, 2014). Thoma et al. (2011) conducted a study to assess six neuropsychological functions and the effects of alcohol and marijuana on these functions in adolescents (N=48) using a series of tests. The effect of substance dependence showed a statistically significant negative impact in the memory (p= 0.003), processing speed (p=0.031), and attention (p= 0.031) domains (Thoma et al., 2011).

The only qualitative study presented aimed to identify beliefs that increase help seeking behaviors or prevent risk behaviors in adolescent patients, ages 12 through 16. Using structured, audio-recorded interviews, results showed a judgment free environment, ensuring confidentiality, and being knowledgeable about community resources may increase the likelihood of help-

seeking behaviors in teens struggling with substance use (Berridge, McCann, Ceetham, & Lubman, 2017).

Clinical practice guideline on adolescent substance use. Disorders occurring in the teen years can affect developmental processes and interfere with normal brain maturation (NIDA, 2014). It is vital for providers to follow evidence based treatment guidelines that cater to the developmental stage and cognitive level of this population. Behavioral interventions, family based interventions, and the use of addiction medications are three approaches shown to be effective in the treatment of adolescent substance use (NIDA, 2014). NIDA (2014) cautions providers to choose an approach on a case-by-case basis; taking into account each adolescent's developmental level, cognitive ability, and unique background to ensure successful treatment.

Screening, Brief Intervention, and Referral to Treatment

Screening, brief intervention, and referral to treatment are the components of SBIRT. Screening is the crucial first step as it leads to the subsequent steps in the process (Mitchell et al., 2013). The second step in the SBIRT process is brief intervention (BI). These interventions last five to ten minutes and are targeted towards those who have moderate symptoms of substance abuse (Mitchell et al., 2013). In the last step of SBIRT, patients at high risk for substance use disorders are referred to appropriate treatment centers. The AAP (2011) guidelines state: scores on CRAFFT greater than or equal to two on patients younger than 14 years, patients with daily use, those admitting to blackouts, or a score greater than or equal to five at any age require immediate referral. See Appendix E for the SBIRT algorithm created by the AAP (2011).

Delivery method. In a cluster, randomized trial by Sterling et al., (2015), SBIRT implementation in adolescent patients (N=1871) was compared among pediatricians trained in SBIRT (N=17), behavioral health care (BHC) providers trained in SBIRT (N=17), and usual care

(UC) providers (N=18). Results showed the BHC provider arm and the pediatrician arm had higher rates of BIs than the usual care arm (pediatrician OR = 10.37, $p < .001$; BHC provider OR = 18.09, $p < .001$). These data suggest that educating providers can improve SBIRT delivery.

The use of technology in different aspects of SBIRT delivery has been studied. Arnaud et al., (2016) found web-based BIs are effective in reducing binge drinking. In this study, 1,449 European teens, ages 16 through 18, who scored greater than or equal to two on CRAFFT, were randomized to an intervention group and a control group. After a three-month period of automated BIs, the intervention group reported significant reductions in drinking when compared to the control group ($p=.010$). Walton et al., (2014) found similar results in a randomized controlled trial, where a computerized BI effectively reduced cannabis use in adolescents (N=714). Results showed the intervention group, who received computer based BIs, had significantly lower rates of cannabis use than the control group, who had in-person BIs, over a 12-month period (16.82% versus 24.16%, $p<0.05$).

Clinical practice guideline supporting SBIRT. In 2015, reports indicated as many as 1.3 million adolescents met criteria for a substance abuse disorder while only nine percent of those patients received treatment (Ozewchowski, Becker, & Hogue, 2016). Ozewchowski, Becker, and Hogue (2016) attempted to address these concerns by creating a framework for adolescent SBIRT, referred to as SBIRT-A. The proposed adaptations presented are only in reference to screening. The first adaptation for screening is caregiver involvement. Ozewchowski, Becker, & Hogue, (2016) recommend screening caregivers for concern of substance use disorders in their child. The second recommendation for the screening process is incorporating technology (Ozewchowski, Becker, & Hogue, 2016). Studies report that adolescents perceived confidentiality to be higher using computer based screens and may be

more likely to report substance use as opposed to paper and pencil methods (Ozewchowski, Becker, & Hogue, 2016). SBIRT is a standardized process that emphasizes the importance of behavioral health in adolescent health care and with the appropriate developmental adaptations, it can be effective in detecting substance use disorder risk in this population.

Theory

The theoretical framework that guided the EBQI project was Jessor's (1991) conceptual framework for adolescent risk behavior: risk and protective factors, risk behaviors and risk outcomes (Appendix F). This complex framework attempts to understand adolescent risk behavior by identifying risk and protective factors in three major constructs that account for variants in behavior leading to adverse health outcomes (Jessor, 1991). The three constructs are the personality system, the perceived environment system, and the behavior system (Jessor, 1987). The key concepts in the theoretical framework are risk, lifestyle, risk factors, and protective factors.

Garmel et al. (2016), Agley et al., (2015), and Jessor et al. (1995) applied these concepts in research. Gamarel et al. (2016) conducted a study (N=2,216) using a cutoff score of greater than or equal to two and found participants who screened positive on CRAFFT were more likely to be behaviorally-infected with HIV (OR = 2.27), report unstable housing (OR = 1.92), and have any lifetime involvement with the criminal justice system (OR = 3.30). This data supports the concept of lifestyle (Gamarel et al., 2016). Agley et al. (2015) found similar data when examining the relationship between risk and protective factors for substance use against CRAFFT in students (N=25,204) across Indiana. The analysis showed the odds of school failure increased by 19.3%, odds of low school commitment increased by 32.3%, and odds of interacting with antisocial friends increased by 48.1%, for patients with substance dependence

(N=4,545). Participants who reported high protection from interaction with antisocial friend groups had a 21.7% decrease in odds of scoring in the substance dependence category on CRAFFT. Lastly, in a multiple regression analysis, Jessor et al. (1995) found empirical support for the concept of protective factors. Unstandardized regression coefficients were reported with protective factors (R = -1.25) negatively correlated to risk behavior (Jessor et al., 1995).

The CRAFFT screening tool asks questions about risk, covering the interrelated concepts of risk factors and protective factors in this framework. There is a specific question about drunk driving as well as a general assessment of risk behaviors by asking if the teen has ever been in trouble due to drugs or alcohol. The tool screens for models of deviant behavior and parent conflict which is listed as a risk factor in the perceived environment construct by asking about friends and family. Teens are asked if they use alcohol or drugs alone and if they have ever forgotten what they have done due to intoxication from drugs or alcohol which relates to the psychological and social constructs.

Methods

Institutional Review Board

The primary institutional review board (IRB) for this project was the University of Missouri Kansas City (UMKC). The IRB determined this project is, *not human subjects research*. The project is categorized as an evidence-based quality improvement project (EBQI) because it is focused on improving the substance use screening process in one pediatric clinic. The student investigator also received written consent for project implementation from the project site. For the purpose of this project, a patient agreeing to complete CRAFFT was viewed as implied assent. According to the HHS (n.d.) each IRB should consider age, maturity, and

psychologic state of minors that are subject to research studies on an individual basis (see Appendix G for IRB determination and letter of approval).

Ethical Issues

Confidentiality and protection are ethical issues related to adolescent health care. Studies have shown adolescents are more likely to seek medical care and share sensitive health information if confidentiality is guaranteed (Gilbert, Rickert, & Aalsma, 2014). In a study by Gilbert, Rickert, and Aalsma, (2014) at adolescent health care visits, conversations regarding sensitive topics were positively correlated with high rates of confidentiality (Gilbert, Rickert, and Aalsma, 2014). Adolescents may withhold information for fear of retribution from parents or even from a legal standpoint (Gilbert, Rickert, & Aalsma, 2014). It is important for providers to be familiar with the laws in their state of practice and to explain these laws to adolescents to foster trust and open communication.

In Missouri, minors are legally able to consent to outpatient drug and alcohol treatment however only emancipated minors may consent to inpatient treatment (Daryl, 2011). Providers are not legally responsible for informing a parent or guardian if a child is diagnosed with or being treated for a substance use disorder (Daryl, 2011). Open communication with a teenage patient is essential and discussing whether and how parents or guardians are involved is encouraged (Daryl, 2011).

In discussion with the pediatric social worker at the clinic site, sensitive topics are typically addressed without a parent present unless the patient agrees to openly discuss these issues with a parent in the room. The social worker is actively involved in managing patients who are in need of behavioral health services and/or substance use treatment. The student investigator worked closely with the social worker when a patient screened positive during the

project in order to appropriately make a referral. The student investigator does not have any conflicts of interest to report.

Funding

The University of Missouri-Kansas City (UMKC) Women's Council Graduate Assistance Fund served as funding for the project. The proposed cost for this project was $715. Office supplies account for approximately $83 and the remaining funds will be allocated to travel for project dissemination. The student investigator was awarded $700 through the Women's Council Graduate Assistance Fund for project dissemination costs (see the budget table in Appendix H for a detailed cost analysis).

Setting and Participants

A pediatric clinic in Missouri was the setting for the EBQI project. Convenience sampling was used to recruit patients who are already visiting the clinic for preventative care (Melnyk & Fineout-Overholt, 2015). The sample size was 70 adolescents, with 35 participants in the baseline group and 35 participants in the intervention group. Inclusion criteria was based on age (12 through 18 years) and the ability to complete the screening tool. Patients were excluded from the study from the study for acute or ill visits, a known substance use disorder diagnosis, or failure to adequately complete the survey.

Intervention

The project intervention focused on screening adolescent patients, ages 12 to 18 years, for substance use, guided by the SBIRT process. Screening is the first and arguably the most important step in SBIRT, as it is the gateway to the subsequent steps (Mitchell et al., 2013). The project used the CRAFFT screening tool, a standardized and developmentally appropriate instrument, to identify patients at high risk for substance use disorders. Eligible patients were

given a paper version of the screening tool on arrival to the pediatric clinic for preventative care visits. The provider scored CRAFFT, before seeing the patient, and assigned *high risk* to patients scoring greater than or equal to two. Patients who screened positive were referred to the substance abuse counselor by the pediatric social worker. The intervention was implemented over a three-month time period. The student investigator was the sole data collector (see Appendix I for the logic model; Appendix J for the participant flow diagram; and Appendix K for the project flow timeline diagram).

Change Process Model and EBP Model

Kotter and Cohen's Model of Change was used to guide this EBQI project (see Appendix L). This eight step process includes increasing urgency, building a guiding team, creating a vision for change, communicating the importance of change for "buy-in", empowering the group to change, creating short-term goals, being consistent, and making the change stick (Melnyk &Fineout-Overholt, 2015). This model stresses the importance of communicating the reason for change by appealing to the emotions behind a project (Melnyk &Fineout-Overholt, 2015). Presenting the sobering facts regarding the impact of adolescent substance abuse and the difference that can be made through screening may increase buy-in from the team.

The Model for Evidence-Based Practice Change was the evidence based practice (EBP) framework used for the EPQI project. This model was helpful because it guided the student investigator through the entire change process (Rosswurm & Larrabee, 1999). The steps of this process include assessing the need for change in practice, locating the best evidence, critically analyzing and synthesizing the evidence, designing practice change, implementing and evaluating change in practice, and integrating and maintaining change (Melnyk &Fineout-Overholt, 2015).

The sustainability of the intervention after project completion is likely. The intervention was adapted to fit with the current workflow in the clinic. Another factor promoting sustainability is the low cost of the intervention. A potential barrier to sustainability after project completion is building the CRAFFT screening tool in to the electronic medical record (EMR) so providers can easily document scores.

Study Design

A quasi-experimental, two independent groups with pre-and post-design was used in the EBQI project. The independent variable was the CRAFFT screening tool and the dependent variable was the number of high risk CRAFFT screens (scores greater than or equal to two). Retrospective chart reviews were performed from the three months before intervention implementation to identify the number of adolescent patients referred to substance abuse treatment. Charts were reviewed for patients, age 12 to 18 years, who visited the clinic for preventative care. Consecutive sampling was used to ensure randomized of the retrospective sample (n=107) by reviewing every third chart for a total of 35 patients. Identification of teens who were considered "high-risk" for substance use disorders pre-intervention was difficult therefore the measured outcome will be the number of patients referred to treatment. The number of pre-intervention referrals was compared to the number of teens identified as *high-risk* post-intervention. The post-intervention sample was composed of the first 35 eligible patients to ensure an adequate sample size. The student investigator utilized the electronic medical record (EMR) to retrieve the baseline information and ensured the protection of both groups by utilizing a password protected computer and EMR log-in, de-identifying the data, and destroying the information as soon as the data was complied.

Validity

Using consistent instrumentation for the EBQI project strengthened internal validity. The CRAFFT screening tool was the only survey used to assess substance use in adolescents during this project. Controlling for confounding variables by establishing inclusion and exclusion criteria also strengthen internal validity. The criteria used to identify patients eligible for the intervention was also used in the chart review for the pre-intervention data (Melnyk & Fineout-Overholt, 2015). Threats to internal validity included front office staff forgetting to hand out the CRAFFT tool, providers scoring CRAFFT incorrectly or forget to address it, and lastly lack of follow through on the referral process not.

The project site clinic cares for an ethnically and socioeconomically diverse population of adolescents which allows for generalizability to similar populations and settings. External validity was also strengthened by making participation for patients as easy as possible (Melnyk & Fineout-Overholt, 2015). The screening tool is a short, six item questionnaire that was attached to the pre-visit paperwork; completed before the patient saw the provider. A threat to external validity was the sampling method. Convenience sampling was used in this project; therefore, the author had little control over the sample size.

Outcomes Measured

The outcome of the EPQI project was to increase identification of patients at high risk for substance use disorders using the CRAFFT screening tool. This outcome was compared to the number of referrals made for substance use disorders in the three months prior to the intervention. The outcomes measured were defined as *patients referred to treatment*. The pre-intervention referrals are not based on a specific screening tool; therefore, validity and reliability are not reported. The post-intervention referrals are based on the CRAFFT screening tool. Previous studies have reported moderate internal consistency (Cronbach's alpha = .73) and

strong positive predictive values (.02-.19) and negative predictive values (.99-1.00) when using a cutoff score of greater than or equal to two on CRAFFT (Thomas et al., 2004). Participants completion required answering the six-item questionnaire prior to the scheduled appointment. The student investigator did not need specific permission to use CRAFFT as it is available in the public domain. A second measured outcome was the number of referrals that were actually completed. The student investigator worked with the pediatric social worker track referral completions.

Quality of Data

The CRAFFT screening tool is the most widely studied and commonly used substance use screening tool in the adolescent population (Alayan & Shell, 2016; AAP, 2011). Literature regarding substance use screening tools in teens often includes the CRAFFT screening tool therefore results from EBQI project can be compared to published data. D'Amico et al. (2016), Gamarel et al. (2017), and Pilowsky et al. (2013) studied the usefulness of CRAFFT in adolescent primary care and was used as benchmark data for comparison to the EBQI project.

A threat to baseline quality of data was identifying patients who were referred to substance use treatment pre-intervention. Without a specific tool or referral process, the documentation did not reflect this information clearly. A threat to the post-intervention quality of data is participant attrition. In order to accurately assess substance use disorders from this survey, the adolescent needed to answer honestly. Lastly, the student investigator was the only person collecting data, therefore personal bias could be a threat to the quality of data. To prevent this, the student investigator used a consistent process for data collection to avoid personal bias. A power analysis was performed to determine the required number of participants with a medium effect of 0.5, a power of 0.8, and a significance level of 0.05 with results showing 31.4

participants are needed (ANZMTG Statistical Decision Tree, 2018). The student investigator collected data for 35 patients in both the retrospective and prospective groups, exceeding minimal requirements for sample size.

Analysis Plan

The results from the project were analyzed using standard descriptive statistics, the Fisher's exact test, and Pearson's chi-square test to compare pre-and post-intervention data. Other variables that were analyzed included patient gender, age, and race (see Appendix M and for the data analysis template).

Results

Setting & Participants

Data was collected from September 4th, 2018 to November 29th, 2018. On average the student investigator was in clinic 3 days a week for data collection during this time period. The intervention was implemented at a pediatric clinic in an urban community health center in Kansas City, Missouri.

Sociodemographic variables. There was a total of 70 participants, 35 in the baseline and 35 in the intervention group. Participant age, sex, and race were recorded. The average age of participants in the intervention group was 14.37 years (*SD* = 1.76) and the average age of the baseline group was 15.08 years (*SD* = 1.56). Gender distribution was similar between the groups. The intervention group was 54% female and 46% male while the baseline group was 60% female and 40% male. Both the intervention and baseline groups were largely African American, with 77% in the intervention group and 68% in the baseline group. The continued breakdown of race in the intervention group included 11% Caucasian, 8% Hispanic, and 3%

other. The remainder of the baseline group was 25% Caucasian, and 5% other. There were no Hispanic patients in the baseline group (see Appendix N for the statistical analysis table).

Intervention Course

The first component of the intervention was IRB approval. This occurred on August 1, 2018. The next step in implementation was educating staff members on the importance of the intervention and how the practice change would occur. The student investigator presented the change models. During this time, the student investigator also collaborated with an information technology specialist to perform a chart review for baseline data.

On September 4th, 2018, data collection was initiated on the intervention group. Halfway through project implementation the student investigator reviewed the data collected with the project facilitators. At that time, there were only 15 participants in the intervention group. Over the next six weeks, the student investigator continued to collect data and reached the goal of 35 participants in the intervention group on November 29th, 2018.

Outcome Data

The purpose of the EBQI project was to determine whether using a standardized, developmentally appropriate screening tool (CRAFFT) improved the identification of adolescent patients at risk for substance use disorders in the primary care setting. Statistical analysis showed a marginal improvement in substance abuse identification between the intervention and baseline group. The baseline group had zero referrals to a substance abuse counselor during the three months prior to intervention implementation based on retrospective chart reviews. During intervention implementation, three patients were referred to a substance abuse counselor based on a positive CRAFFT screen.

Fisher's exact test was performed to examine the difference between substance abuse identification in the baseline and intervention groups. The relationship between these variables did not show significance using Fisher's exact test (p = .120; see Appendix O for statistical analysis results table). A secondary outcome for the EBQI project was the number of substance abuse counseling appointments actually completed by the patients who were referred to treatment based on the CRAFFT screening tool. As of December 6th, 2018, none of the patients referred to treatment had attended a counseling appointment. This information was obtained after data collection was complete from the pediatric social worker at the project site. All data entered for statistical analysis was valid; there were no missing data points to report.

Discussion

Success

Given the scope of the project, results showing a trend toward significance is considered a success. Another success of this project includes the introduction of the standardized tool for patients and providers in the clinic. While only three patients screened positive, the tool gave providers the opportunity to have a discussion about substance use with each adolescent who completed CRAFFT.

Study Strengths

Next, by using Kotter and Cohen's Model of Change (Melnyk & Fineout-Overholt, 2015), the steps in the intervention process were implemented without incident, staff members bought-in to the importance of the topic, and CRAFFT was routinely handed out to eligible patients. The intervention was modeled to fit the clinic work flow which helped minimized change for staff. Also, the CRAFFT screening tool is a short questionnaire therefore patients were able to complete it before seeing a provider.

Another strength of the EBQI project included the project facilitators. The nurse practitioner and social worker at the project site provided leadership and guidance to the student investigator throughout this process. The pediatric social worker assisted in referring patients with a positive screen and helped the provider and student investigator discuss the results of CRAFFT with the patient. Lastly, a success of the EBQI project was low cost. The supplies necessary for project implementation were minimal, making sustainability more likely.

Results Compared to Literature

Garmel et al. (2017), D'Amico et al. (2016), and Oestrle et al. (2015) used a cut off score of greater than or equal to two in order to evaluate the effectiveness and usefulness of CRAFFT in detecting risk for substance abuse disorders in adolescents. Results from these studies were similar to results from the EBQI project. Garmel et al. (2017) found CRAFFT was reliably associated with substance use behaviors. Participants in the study who reported higher levels of substance use had increased odds of screening positive on CRAFFT (Garmel et al., 2017). D'Amico et al. (2016) found CRAFFT had excellent sensitivity (0.98) for detecting alcohol use disorders and also performed well for cannabis use disorder CUD. However, CRAFFT did have slightly lower specificity (0.72) compared to other substance use screening tools in the study (D'Amico et al., 2016).

While a cut off score of greater than or equal to two was used by Oesterle et al. (2015) to evaluate CRAFFT, the study differs from the EBQI project because scores were correlated with laboratory measures of alcohol and substance use. The investigators found high correlations between higher CRAFFT scores and positive lab screening for alcohol ($p=0.0048$) and marijuana ($p=0.0001$) (Oesterle et al., 2015). In a study by Skogen et al. (2013), a cut off value of greater than or equal to one on CRAFFT was used to determine substance abuse disorder risk. With this

cut off value, CRAFFT showed good sensitivity in relation to concurrent measures with rather low specificity (Skogen et al., 2013). The authors noted that using the recommended cut off of greater than or equal to two leads to lower sensitivity and high specificity compared to cut off of greater than or equal to one (Skogen et al., 2013). However, it is stated in the study that regardless of which cut off point is used that results indicate CRAFFT has an adequate ability to determine substance-related problems (Skogen et al., 2013). The results of the Skogen et al. (2013) study are similar to the results of the EBQI project.

Another similarity between the EBQI project and studies by Gamarel et al. (2017), D'Amico et al. (2016), Oesterle et al., (2015), and Skogen et al. (2013) include lack of generalizability. The study by Gamarel et al. (2017) was conducted with a specific patient population, youth living with human immunodeficiency virus (HIV). D'Amico et al.'s (2016) study was conducted in two family-based community health clinics in underserved areas. While the authors noted the population was ethnically and racially diverse with wide age ranges, it was only conducted at two sites (D'Amico et al., 2016). The population in the study by Skogen et al. (2013) was not generalizable as it was set in a school as opposed to a healthcare clinic. Similar to the study by Gamarel et al. (2017), Oesterle et al. (2015) worked with a specific population. The study used CRAFFT to survey adolescent patients being admitted to an inpatient psychiatric unit.

Limitations

The EBQI project has several limitations. The following will be reviewed: the effects of internal and external validity, plans for sustainability, efforts to maintain the intervention, and efforts to minimize limitations will be examined.

Interval Validity Effects

Internal validity was promoted through the use of a single tool, using inclusion and exclusion criteria, and consistent reminders to staff regarding the intervention. CRAFFT was the only substance use screening tool used. This tool has been widely studied and has shown to be valid and reliable in substance abuse disorder risk in the adolescent population (Thomas et al., 2004). The same inclusion and exclusion criteria was used for both groups for validity in comparison of the groups.

A confounding variable possibly effecting the outcome of the project includes reliance of self-reporting of substance use by the participants. The student investigator had no control over how honestly participants answered survey questions. Lack of documentation used in the baseline group is a second confounding variable. Without a standardized tool or at least standardized documentation of discussion of substance use with the patient, the chart reviewer could not be sure if substance abuse was discussed and followed by a subsequent referral during the preventative visit. Lastly, a possible confounding variable includes bias by the student investigator. The student investigator was the sole data collector for the EBQI project.

External Validity Effects

Another limitation of this study includes lack of generalizability of results to other populations and settings. This project was only completed at one site. The clinic site was a public health clinic serving a low-income urban population where approximately 90% are insured through Medicaid. The results of the intervention may not be generalizable, although the intervention is transferable to suburban, rural, or private clinic settings.

Sustainability of Effects & Plans to Maintain

There is potential for gains made over the course of the project to weaken over time. Front desk staff may forget to provide CRAFFT to eligible patients. Patients may not fill out the

survey for fear of punishment for honest answers, or patients may ignore CRAFFT because they feel there is too much paperwork to complete. Lastly, providers in the clinic are busy, and while substance abuse is an important topic to discuss, if the patient comes with several other complaints, CRAFFT may not be addressed.

In order to maintain the improvement from this EBQI project, screening adolescent patients for substance use must become a standard of practice. The project was designed with the current clinic workflow in mind. However, adding the CRAFFT to the same piece of paper already being used to gather patient information, may improve workflow for the front desk staff as well as the patients. Instead of front desk staff providing adolescent patients both intake sheets, only one would be necessary, decreasing the likelihood of missing patients who should be screened. Patients may also be more likely to fill out the CRAFFT screening tool if it is a continuation of the intake information already being addressed.

Efforts to Minimize Limitations

The student investigator incorporated several tactics to minimize the impact of limitations on the results of the EBQI project. Providers educated adolescent patients on Missouri confidentiality laws in hopes of promoting honest responses. While efforts were made to limit the impact of self-reported measures during the EBQI project, this issue was noted in discussion of limitations in several studies (Garmel et al. 2017; D'Amico et al. 2016; Oestrle et al. 2015; & Skogen et al. 2013). If participants underreported substance use, this would skew the project outcomes. Another limitation of the EBQI project was lack of generalizability of the results. While participant gender and age had a fairly even distribution, the majority of the participants were African American. In order to generalize results, participants' race should have an equal

distribution. Lastly, bias by the student investigator was limited through consistent methods for data collection.

Interpretation

Expected and Actual Outcomes

Based on the literature, CRAFFT was expected to significantly improve identification of adolescent patients at risk for substance use disorders. Marginal improvement was an unexpected outcome. The student investigator identified small sample size as a reason for the difference between observed and expected outcomes. With a larger sample size, the statistical significance may be reached.

A failure identified during the EBQI project is lack of follow through for referral appointments. Three of the 35 patients in the intervention group were identified as *high risk* based on CRAFFT and were referred to a substance abuse counselor. The pediatric social worker followed up with these patients two weeks after referral and none had scheduled their appointments based on the referral from their primary care provider. Possibilities for not scheduling an appointment include lack of parental knowledge of a positive screen due to confidentiality laws, lack of resources to provide a ride to the appointment, and unwillingness to seek treatment by the patient.

Intervention Effectiveness and Revisions

This intervention is most likely to be effective in a primary care setting. The topic of substance abuse is important to discuss at preventative care visits with a trusted healthcare provider (AAP, 2011). The intervention could be modified to maintain improvement by incorporating technology. The student investigator recommends working with information technology specialist to build CRAFFT into the EMR. If CRAFFT is built in to the EMR,

providers may be more likely to address it during visits. Another way to incorporate technology is allowing patients to complete CRAFFT electronically. Studies suggests that adolescents are more likely to answer questions honestly, through computer automated surveys because the perceived confidentiality is higher (Ozewchowski, Becker, & Hogue, 2016). While this would be more costly due to the need for a tablet or computer, the results may be more accurate.

The expected impact of the EBQI project was to identify adolescent patients at risk for substance use and refer those patients to treatment before adverse events occurred. The intervention made a positive impact on the project setting by giving providers a quick and easy tool to screen adolescent patients for substance use. It also identified three patients, who needed referral to a substance abuse counselor. The positive screen should be discussed at subsequent visits to ensure follow up by the provider and accountability of the patient. While it is important to identify patients at risk for substance use disorders, without follow through and treatment, the patient receives little benefit. Future projects should focus on helping patients who are referred, actually attend counselling appointments. The intervention also has the potential to effect healthcare at a systems level. Identifying at risk patients before adverse health events occur could decrease healthcare expenditure by reducing costs associated with chronic diseases caused by substance abuse (NIDA, 2017).

Expected and Actual Impact to Health System and Policy

The estimated cost of the EBQI project, not including project dissemination costs, was $82.98. These costs consisted of paper and toner in order to print the CRAFFT screening tool. The actual cost of the project, to the student investigator, was $0. The project facilitator encouraged the student investigator to use resources available at the project site to print the number of surveys needed at the beginning of each clinic day. Project dissemination costs were

estimated at $781.00. The actual dissemination costs were $765.00. The cost breakdown includes printing the project poster, airfare, lodging, and conference fees. Funding sources for the EBQI project include the UMKC Women's Council Graduate Assistance Fund. The student investigator used the awarded $700.00 for project dissemination costs.

There is great potential for economic sustainability of the intervention. It was a low-cost intervention that could easily be incorporated in to the setting's current practice. Each patient is given paper questionnaires before preventative care visits. CRAFFT could be added to the end of the paper already being used for adolescent patients. Sustaining this EBQI project would not be an added expense to the clinic.

Conclusion

Further implementation of the project should focus on continuing the quality improvement initiative to obtain a larger sample size to determine significance of results. There should also be focus on helping patients who are referred actually attend their counseling appointments. Teaching primary care providers brief intervention strategies will increase their comfort levels in addressing substance use with teens as well as motivate these patients to make behavior changes (Sterling et al., 2015). Project results were disseminated as a poster presentation at the Arkansas Nurse Practitioner's Association's 4th Annual Conference in Little Rock, Arkansas on April 12th, 2019.

Implementation of the EBQI project had the potential to benefit adolescent patients as well as pediatric care providers. Identification of patients at risk for a substance use disorder will lead to interventions that target behavior change before serious adverse events occur. This project will also benefit practitioners. Providers have identified lack of time and lack of familiarity with simple screening methods as barriers to screening adolescent patients for

substance abuse (Levy & Williams, 2016). Giving providers a standardized screening tool that is quickly and easily administered may increase the number of pediatric patients screened for substance use. Screening adolescents for substance use has the potential to impact healthcare on a large scale by decreasing the national burden substance abuse disorders cause through early identification and treatment.

References

ANZMTG Statistical Decision Tree. (2018). Retrieved from: https://www.anzmtg.org/stats/PowerCalculator/PowerChiSquare

Agley, J., Gassman, R. A>, Jun, M., Nowicke, C. & Samuel, S. (2015). Statewide administration of the CRAFFT screening tool: Highlighting the spectrum of substance use. *Substance Use & Misuse, 50(13),* 1668-1677. doi: 10.3109/10826084.2015.1027930

Alayan, N. & Shell, L. (2016). Screening adolescents for substance use: The role of NPs in school settings. *The Nurse Practitioner,* 1-6. doi: 10.1097/01.NPR.0000482380.82853.c0.

Arnaud, N., Baldus, C., Elgan, T.H., Paepe, N.D., Tonnesen, H… & Thomasius, R. (2016). Effectiveness of a web-based screening and fully automated brief motivational intervention for adolescent substance use: a randomized controlled trial. *Journal of Medical Internet Research, 18(5)*. doi: 10.2196/jmir.4643

American Academy of Pediatrics. (2011). *Substance use screening, brief intervention, and referral to treatment for pediatricians*. doi: 10.1542/peds.2011-1754

Berridge, B. J., McCann, T. V., Cheetham, A. & Lubman, D. I. (2017). Perceived barriers and enablers of help-seeking for substance use problems during adolescence. *Youth Health, 19(1),* 86-93. doi: 10.1177/1524839917691944

Burns, C. E., Dunn, A. M., Brady, M. A., Starr, N. B., Blosser, C. G., & Garzon, D. L. (2017). *Pediatric Primary Care*. (6th). St. Louis, Missoui: Elsevier. ISBN9780323243384

Centers for Disease Control and Prevention. (2016). *Fact sheet – underage drinking*. Retrieved from https://www.cdc.gov/alcohol/fact-sheets/underage-drinking.htm

D'Amico, E. J., Parast, L., Meredith, L. S, Ewing, B. A., Shadel, W.G. & Stein B.D. (2016). Screening in primary care: what is the best way to identify at-risk youth for substance use? *Pediatrics, 138(6)*. doi: 10.1542/peds.2016-1717

Daryl, A. L. (2011). Adolescent "Shorts": Consent involving minors. *Children's Mercy Hospital*. Retrieved from: https://www.childrensmercy.org/content/uploadedFiles/Departments/Department_of_Pediatrics/Divisions/Adolescent_Medicine/Fall%20Quarter.pdf

Gamarel, K. E., Nelson, K. M., Brown, L., Fernandez, M., I., & Nichols, S. The usefulness of the CRAFFT in screening for problematic drug and alcohol use among youth living with HIV. *AIDS and Behavior*, 1-10. doi: 10.1007/s10461-016-1640-2

Gilbert, A. L., Rickert, V. I., Aalsma, M. C. (2014). Clinical conversations about health: the impact of confidentiality in preventive adolescent care. *The Journal of Adolescent Health, 55(5)*, 672-677. doi: 10.1016/j.jadohealth.2014.05.016

Jessor, R., Van Den Bos, J., Vanderryn, J., Cost, F., & Turbin, M. (1995). Protective factors in adolescent problem behavior: Moderator effects and developmental change. *Developmental Psychology, 31(6)*, 923-922. doi: 0012-1649/95.

Jessor, R. (1991). Risk behavior in adolescence: A psychosocial framework for understanding and action. *Journal of Adolescent Health, 12*, 597-605.

Jessor, R. (1987). Problem-Behavior Theory, psychosocial development, and adolescent problem drinking. *British Journal of Addiction, 82*, 331-342.

Levy, S. & Williams, J. F. (2016). Substance use screening, brief intervention, and referral to treatment. *Pediatrics, 138(1)*, 1-15. doi: 10.1542/peds.2016-1211

Melnyk, D. & Fineout-Overholt, E. (2015). *Evidence-based practice in nursing and healthcare*. (3rd ed.). Philadelphia, PA: Lippincott Williams & Wilkins. ISBN 9781451190946

Mitchell, S. G., Gryczynski, J., O'Grady, K. E., & Schwartz, R. P. (2013). SBIRT for adolescent drug and alcohol use: current status and future directions. *Journal of Substance Abuse Treatment, 44*, 463-472. doi: 10.1016/j.jsat.2012.11.005.

National Institute on Drug Abuse. (2017). *Trends & Statistics*. Retrieved from https://www.drugabuse.gov/related-topics/trends-statistics

National Institute on Drug Abuse. (2015). *Principles of Adolescent Substance Use Disorder Treatment: A Research-Based Guide*. Retrieved from: https://d14rmgtrwzf5a.cloudfront.net/sites/default/files/podata_1_17_14.pdf

Oesterle, T., Hitschfeld, M. J., Lineberry, T. W., & Schneekloth, T. D. (2015). CRAFFT as a substance use screening instrument for adolescent psychiatry admissions. *Journal of Psychiatric Practice, 21(4)*, 259-266. doi: 10.1097/PRA. 0000000000000083

Ozechowski, T. J., Becker, S. J., & Hogue, A. (2015). SBIRT-A: Adapting SBIRT to maximize developmental fit for adolescents in primary care. *Journal of Substance Abuse Treatment, 62*, 28-37. doi: 10.1016/j.sat.2015.10.006.

Pilowsky, D. J. & Wu, L T. (2013). Screening instruments for substance use and brief interventions targeting adolescents in primary care: A literature review. *Addictive Behaviors, 38*, 2146-2153. doi: 10.1016/j.addbeh.2013.01.015

SBIRT: Screening, Brief Intervention, and Referral to Treatment. (n.d.). *Substance Abuse and Mental Health Services Administration*. Retrieved from https://www.integration.samhsa.gov/clinical-practice/sbirt

Skogen, J. C., Boe, T., Knudsen, A. K., & Hysing, M. (2013). Psychometric properties and concurrent validity of the CRAFFT among Norwegian adolescents. Ung@hordaland, a population-based study. *Addictive Behaviors, 38*, 2500-2505. doi: 10/1016/j.addbeh.2013.05.002.

Smith, A. R., Rosenbaum, G. M., Botdorf, M. A., Steinberg, L., & Chein, J. M. (2018). Peer influence adolescent reward processing, but not response inhibition. *Cognitive, Affective, & Behavioral Neuroscience*, 1-12. doi: 1.3758/s13415-018-0569-5

Sterling S., Kline-Simon, A. H., Weisner, C., Jones, A., Satre, D., & Wong, A. (2015). Adolescent SBIRT implementation in pediatric primary care: results from a randomized trial in an integrated healthcare delivery system. *Addiction Science & Clinical Practice, 10*, 1-2. doi: 10.1186/1940-0640-10-S1-A62.

Subramaniam, M., Ceok, C., Verma, W., Wong, J. * Chong, S. A. (2010). Validity of a brief screening instrument CRAFFT in a multiethnic Asian population. *Addictive Behaviors, 35*, 1102-1104. doi:10.1016/j.addbeh.2010.08.004.

The Ted Reports: Age of substance use initiation among treatment admissions aged 18 to 30. (2012). *Substance Abuse and Mental Health Services Administration*. Retrieved from: https://archive.samhsa.gov/data/2k14/TEDS142/sr142-initiation-age-2014.htm

Thomas, M. K., Donovan, J. E., Chung, T., Cook, R. L., Delbridge, T. R. (2004). Alcohol use disorders among emergency determent-treated older adolescents: A new brief screen

(RUFT-Cut) using the ADUIT, CAGE, CRAFFT, and RAPS-QF. *Alcoholism: Clinical and Experimental Research, 28(5),* 746-753. doi: 0145-6008/04/28050746$03.00/0

Rosswurm, M. A. & Larrabee, J. H. (1999). A model for change to evidence-based practice. *Journal of Nursing Scholarship, 31(4),* 317-322.

United States Census Bureau. (2016). *QuickFacts: Jackson, County Missouri*. https://www.census.gov/quickfacts/fact/table/jacksoncountymissouri/PST045217

United States Department of Health and Human Services. (2015). *Missouri Adolescent Substance Abuse Facts*. Retrieved from https://www.hhs.gov/ash/oah/facts-and-stats/national-and-state-data-sheets/adolescents-and-substance-abuse/missouri/index.html

United States Department of Health and Human Services. (n.d.). *Research with Children FAQs*. Retrieved from: https://www.hhs.gov/ohrp/regulations-and-policy/guidance/faq/children-research/index.html

University of Missouri Kansas City. (2018). *Women's Council*. Retrieved from: https://www.umkcwc.org/s/1236/16/index-sub.aspx?sid=1236&gid=3&pgid=343

Walton, M. A., Resko, S., Barry, K.L., Chermack, S. T., Zucker, R.A… Blow, F. C. (2014). A randomized controlled trial testing the efficacy of brief cannabis universal prevention program among adolescents in primary care. *Addiction, 109(5),* 786-797. doi: 10.111/add.12469.

Whittle, A. E., Buckelew, S. M., Satterfield, J. M., Lum, P. J., & O'Sullivan, P. (2015). Addressing adolescent substance use: teaching screening, brief intervention, and referral to treatment (SBIRT) and motivational interviewing (MI) to residents. *Substance Abuse, 36,* 353-331. doi: 10/1080/08897077.2014.965292.

Appendix A

CRAFFT Screening Tool

1. Have you ever ridden in a CAR driven by someone (including yourself) who had been using alcohol or drugs?
2. Do you ever use alcohol or drugs to RELAX, feel better about yourself, or fit in?
3. Do you ever use alcohol or drugs while you are ALONE?
4. Do you ever FORGET things you did while using alcohol or drugs?
5. Do your FAMILY or FRIENDS ever tell you that you should cut down on your drinking or drug use?
6. Have you gotten into TROUBLE while you were using alcohol or drugs? (AAP, 2011)

Appendix B

Definition of Terms

Substance Use Disorder: occurs when recurrent use of alcohol or drugs causes clinically and functionally significant impairment, labeled as mild, moderate, or severe, diagnosis is based on evidence of impaired control, social impairment, risky use, and failure to meet responsibilities at work, school, or home (SAMHSA, nd)

CRAFFT Screening Tool: acronym for Car, Relax, Alone, Forget, Family/Friends, Trouble, this is the standardized substance use screening tool or measurement instrument for this project (AAP, 2011)

SBIRT: screening, brief intervention, and referral to treatment, an evidence-based process used in community-based screening to identify, reduce, and prevent substance use (SAMHSA, nd)

"High Risk" for Substance Use Disorder: for the purpose of this project, this is defined as scoring greater than or equal to two on CRAFFT (AAP, 2011)

Pre-Intervention "High Risk" for Substance Use Disorder: "at risk" will be assigned to any adolescent patient referred to treatment for pre-intervention data

Appendix C

Synthesis of Evidence Table

PICOTS Statement In the adolescent (12 to 18 years of age) population does the use of a developmentally appropriate substance abuse screening tool (CRAFFT) compared to not using a substance use screening tool improve the identification of teens at risk for substance use disorders during a six-month period at one outpatient clinic?						
First author, Year, Title, Journal	**Purpose**	**Research Design[1] , Evidence Level[2] & Variables**	**Sample & Sampling, Setting**	**Measures & Reliability (if reported)**	**Results & Analysis Used**	**Limitations & Usefulness**
Subtopic: CRAFFT Screening Tool						
Gamarel (2017). The usefulness of the CRAFFT in screening for problematic drug and alcohol use among youth living with HIV. *AIDS and Behavior.*	Determine whether CRAFFT is reliably associated with substance use behavior among youth living with HIV	Quantitative, Cross-sectional survey, observational study, level IV	2216 youth age 12-16 living with HIV, recruited at routine clinic visits from broadly distributed areas in US and Puerto Rico in 17 metropolitan areas	CRAFFT, substance use, sociodemographic variables	Descriptive statistics, Fisher's exact tests, logistic regression models, chi-square analyses, strong support for usefulness of CRAFFT as screening tool for YLWH	Results generalizable only to YLWH, cross-sectional design limits ability to make causal inferences, over or underreporting by participants is unknown
D'Amico (2016). Screening in primary care: what is the best way to identify at-risk youth for substance use? *Pediatrics.*	Compare DSM-5 and CUD criteria to several screening tools for adolescents	Observational study, level IV, quantitative	Convenience sample of 1573 youth, from 4 family based clinics (1 in LA, 3 in Pittsburgh)	Compared NIAAA SG, PESQ-PS, AUDIT, CRAFFT, Sensitivity, specificity, PPV, NPV against DMS5 diagnosis of AUB and CUD	Analyses performed via R version 3.2.4, CRAFFT and PESQ-PS had excellent sensitivity for detecting AUD and CUD	Self-report, only sampled in 2 states so may not be generalized

Agley (2015). Statewide administration of the CRAFFT screening tool: highlighting the spectrum of substance use. *Substance Use & Misuse.*	Analyzes state level survey that includes the CRAFFT screening tool to elucidate spectrum of substance use severity in Indiana	Quantitative, Secondary analysis of data collected by Indiana ATOD Survey, Level IV non-experimental study	25,204 adolescents in Indiana schools, convenience sample	Outcome Variables: score on CRAFFT tool Sociodemographic variables Age of first alcohol use Poly drug use Risk and protective factors, risk, alpha=0.800	Multinomial logit analyses to examine relationship between variables, reliability not reported Descriptive statistics, Seriousness of use is not uniform across substance users, 49% were non-problem users, 33% problem users, 18% dependent, results indicate teens who report past month use of multiple substances are at risk for problem use as assessed by CRAFFT	Only 21.8% of schools participated in survey, more Hispanics than white or African American, excluded patients <14 years old, study did represent nearly 1/3 of all enrolled 6^{th}-12^{th}
Oesterle, T. (2015). CRAFFT as a substance use screening instrument for adolescent psychiatry admissions. *Journal of Psychiatric Practice.*	Examine the usefulness of CRAFFT in adolescent psychiatric inpatients	Quantitative non-experimental, cross-sectional, retrospective chart review, level IV evidence	Mayo Psychiatry and Psychology Treatment Center Child and Adolescent Unit, n=645 ages 15-18 who completed CRAFFT on admission, convenience sample	Age, sex, race, legal status, previous suicide attempts, history of psychological, physical/sexual trauma, depressive symptoms, risk of substance use disorders, alcohol and drug lab test results, primary or secondary substance use disorder diagnosis	X2 for categorical variables and student t test for continuous variables, Fisher exact test and Wilcoxon rank-rum test, an at-risk CRAFFT was able to accurately predict who would receive diagnosis of substance use disorder at discharge (69.8% of those with CRAFFT score >/= to	Limitations are retrospective review, primarily white population lacks generalizability to diverse populations, only 645 of 1142 admissions had CRAFFT data, CRAFFT is valid tool to screen for substance in adolescence

					2 versus 17.4% with CRAFFT <2)	
Pilowsky. (2013). Screening instruments for substance use and brief interventions targeting adolescents in primary care: A literature review. *Addictive Behaviors*.	Examine substance use screening instruments used in adolescents, compare their effectiveness, and SBIRT	Evidence from review of quantitative literature, evidence level III	Searched Ovid MEDLINE and PsycINFO, 35 journal articles, key words: alcohol screening, drug screening, adolescence, SBIRT	CRAFFT, RAFFT, CAGE, TWEAK, AUDIT, low risk, moderate risk, high risk	CRAFFT >/=2 showed over all higher sensitivity, specificity, PPV, NPV, Cronbach's alpha =0.68, than other tools, also the most widely studied	No limitations noted, CRAFFT data is more consistent than other tools in this population, supports use in primary care
Skogen, J. (2013). Psychometric properties and concurrent validity of the CRAFFT among Norwegian adolescents.Ung@hordal and, a population-based study. *Addictive Behaviors*.	Examine psychometric properties of CRAFFT and its concurrent validity with self-reported measures of alcohol and drug use among Norwegian adolescents	Quantitative non-experimental, level IV evidence	9,680 Norwegian adolescents born between 1993-1995 in Hordaland county, Convenience	CRAFFT-questionnaire, self-reported alcohol consumption in measured units of beer, cider, wine, spirits, illegally distilled spirits, binary measure of illicit drug use	Kuder-Richardson measure of reliability, receiver operator characters to assess validity Supports use of CRAFFT as measure of single latent structure, AUC-curves indicate adequate ability to detect alcohol-drug related problems, Item response theory, receiver operator characteristics	Validity was evaluated by self-reporting when the "gold standard" is clinical interviews, alcohol use can be underreported, majority of participants filled out survey during school which may have influenced sample, questionnaire administered on a computer,

						CRAFFT is useful with a cutoff score >/=2
Subramaniam, M. (2010). Validity of a brief screening instrument-CRAFFT in a multiethnic Asian population. *Addictive Behaviors*.	Aims to validate CRAFFT screening test, against DSM-IV axis 1 based diagnostic inventory in a population of adolescents and young adult males in Singapore	Quantitative non-experimental cohort design, level IV evidence	23,248 Asian males in Singapore who had health assessments before enlisting in the military, convenience	CRAFFT questionnaire and the Composite International Diagnostics Interview (CIDI)	Kuder-Richardson formula, ROC plot sensitivity, exploratory factor analysis, Cronbach's alpha (0.73), CRAFFT is valid for screening adolescents for substance-related disorders in multiethnic population of adolescent and young adult males	Self-reported, may have had under and/or reporting of substance use, study used cutoff score of 1 compared to cutoff score of 2 in many other studies
Subtopic: Adolescent Substance Use						
Smith. (2018). Peer influence adolescent reward processing, but not response inhibition. *Cognitive, Affective, & Behavioral Neuroscience*	Exam potential influence of peers on the capacity for impulse control and associated recruitment of brain's control circuity	Quantitative, case control study, level IV evidence	28 adolescents age 15-17 at Temple University Hospital's MRI center (Philadelphia, PA), convenience sampling of subsample of participants who had successfully completed larger project	Three rounds of probabilistic gambling task and two rounds of go/no-go task and alone vs peer	Mixed-effects ANOVAs to examine impacts of social context (peer vs alone) and wheel category (risk vs safety), shoed manipulation of social context impacts behavior in risk-taking task	Small sample size, some analyses may have been underpowered, response inhibition task was very easy for some participants therefore did not produce high rate of false alarms, findings extend current literature on peer influence

Berridge, B. J. (2017). Perceived barriers and enablers of help-seeking for substance use problems during adolescence. *Youth Health.*	Identify perceptions that would facilitate or prevent adolescents from seeking support for substance use problems from formal and informal sources	Qualitative interpretative design, using semi-structured, audio-recorded interviews, Evidence level VI	34 adolescents (12-16 years) from two schools in Melbourne, Australia were recruited	Gender, age, school (inner city v suburban), home language, substance use, prior help-seeking experience, mental health, alcohol/drug problem	IPA framework, transcripts coded into primary themes the grouped into conceptual themes, three themes identified as barriers/enablers to help seeking: perceived approachability, perceived confidentiality and trustworthiness, perceived level of expertise of help sources	Limitations: questions were hypothetical as participants did not have personal experience with help-seeking, qualitative methodology used was rigorous, generalizability is not obtained from sample representativeness, provides insight in to how formal and informal help sources facilitate early help seeking in adolescents
National Institute on Drug Abuse (NIDA). (2014). Principles of adolescent substance use disorder treatment: Research-based guide	Describes approaches, as well as presents set of guiding principles about substance abuse and treatment in adolescents	Evidence Level I, EBP Guideline		Discusses principles of adolescent substance use disorders, various treatment settings, and EBP approaches to treatment	Presents various treatment approaches designed to address specific situations/aspects of drug use	Limitations: most of the treatment approaches were test over short periods (12-16 weeks), very thorough, useful for providers in various settings
Thoma, R. (2011). Adolescent substance	Assess neuropsychologi	Quantitative, Evidence	48 adolescents	Age, drinks per day, Percentage	More drinks per day – poorer attention,	Analyses suggests heavy

abuse: The effects of alcohol and marijuana on neuropsychological performance. *Alcoholism: Clinical and Experimental Research*.	cal effects of substance use in adolescence by evaluating independent effects of alcohol and marijuana on neuropsychological functioning	level III, control trial without randomization	(ages 12-18), recruited in 3 groups (health control, group with substance use disorder, group with family history of substance use disorder but no personal history) at University of New Mexico	days drinking, percentage days marijuana use, verbal reasoning, visuospatial ability, executive function, memory, attention, processing speed	executive functioning, more marijuana – poor memory, adolescents with substance use disorder – lower scores on attention, memory and processing speed, family history – poor visuospatial ability, MANCOVA analyses	alcohol use in teens leads to decreased attention, executive functioning, marijuana leads to decreased memory, limitations: low power to detect effects because of small sample size, lack of comprehensive screening for prenatal exposure, lack of control over other psych conditions
Subtopic: SBIRT						
Arnaud, N. (2016). Effectiveness of a web-based screening and fully automated brief motivational intervention for adolescent substance use: a randomized controlled trial. *Journal of Medical Internet Research.*	Evaluate effectiveness of targeted fully automated web-based BI intervention with no face to face component for screening adolescents for substance use	Web-based two-armed multisite randomized control trial, level II evidence, quantitative	Convenience sample of 1449 teens age 16-18 years from Sweden, Germany, Belgium, Czech Republic recruited using online and offline methods,	Baseline and follow up assessments, CRAFFT screen	Web-based format can be effective to reduce drinking and lessen existing substance use service barriers for at risk European teens, t-test, chi-square tests, logistic regressions	Limited by large drop out, significant between groups effects for alcohol use

			screened online with CRAFFT			
Ozechowski. (2015). SBIRT-A: Adapting SBIRT to maximize developmental fit for adolescents in primary care. *Journal of Substance Abuse Treatment.*	Explain ways SBIRT can be tailored to better serve teens in primary care	Evidence based guideline, Evidence level I		None reported	Take advantage of every clinical encounter for screening, involve caregivers in assessments and BIs, family-centered treatment and referral	Adaptations in article have potential to enhance detection of adolescents with substance use problems in primary care
Sterling, S. (2015). Implementation of screening, brief intervention, and referral to treatment for adolescents in pediatric primary care: A cluster randomized trial. *JAMA Pediatrics.*	Compare SBIRT implementation in pediatric primary care among trained pediatricians, pediatricians working in coordination with behavioral health care practitioners, and usual care	Quantitative, 2-year non-blinded, cluster randomized hybrid implementation and effectiveness trail, Level II evidence	1871 patients aged 12-18 years, 47 pediatricians at Kaiser Permanente Northern California a non-profit integrated health care system	Patient age, sex, race/ethnicity and their TWCQ response as well as pediatrician age, sex, years of experience	Standard descriptive statistics, analyses performed using SAS statistical software, version 9.3, Intervention arms had better screening, assessment, and BI rates than UC arm	Limitations-contamination may have occurred between intervention and UC pediatricians, non-measured confounding variables could exist, study suggests barriers to having pediatricians address substance use in primary care
Walton, M. A. (2014). A randomized controlled trial testing the efficacy of a brief cannabis universal prevention program among	Examine efficacy of brief intervention delivered by person or by computer in	Quantitative non-experimental, randomized control trial,	714 adolescents, age 12-18, recruited	Primary outcome: cannabis use (any and frequency), secondary outcomes: other drug use, severity	Computer intervention group had significantly lower rates of cannabis use over 12 months (16.82%	Computer intervention appeared to prevent/reduce cannabis use

adolescents in primary care. **Addiction**.	preventing cannabis use in adolescents	Evidence level II		of alcohol use, frequency of delinquency	versus 24.16% p<0.05) Fisher's exact test, regression analyses	
Mitchell, S. G. (2013). SBIRT for adolescent drug and alcohol use: current status and future directions. *Journal of Substance Abuse Treatment.*	Reviews literature on SBIRT for adolescents, focusing on RCT	Literature review of RCTs, non-experimental level III evidence, quantitative	13 articles describing separate RCTs for adolescent SBIRT implementation at various settings	Inclusion criteria for studies reviewed: participants 14-17 years old, English language publications, exclusion criteria: studies focusing solely on college age, universal prevention programs, treatments that exceeded 3 sessions, foreign language publications	Literature on SBIRT for adolescents is underdeveloped, Review suggests several directions for future of adolescent SBIRT: more research on valid screening tools, diagnostic interviews, and more RCTs looking at various settings	Fluctuation in substance use rates over the years, considerable heterogeneity of participant age-mix characteristics, did not conduct meta-analysis of existing RCTs due to limited number of studies
American Academy of Pediatrics. (2011). Substance use screening, brief intervention, and referral to treatment for pediatricians.	Address practitioner challenges in giving adolescents appropriate guidance regarding substance use during routine care	Level I Evidence, evidence based guideline				Present algorithm to augment provider confidence and abilities related to substance use SBIRT

Appendix D

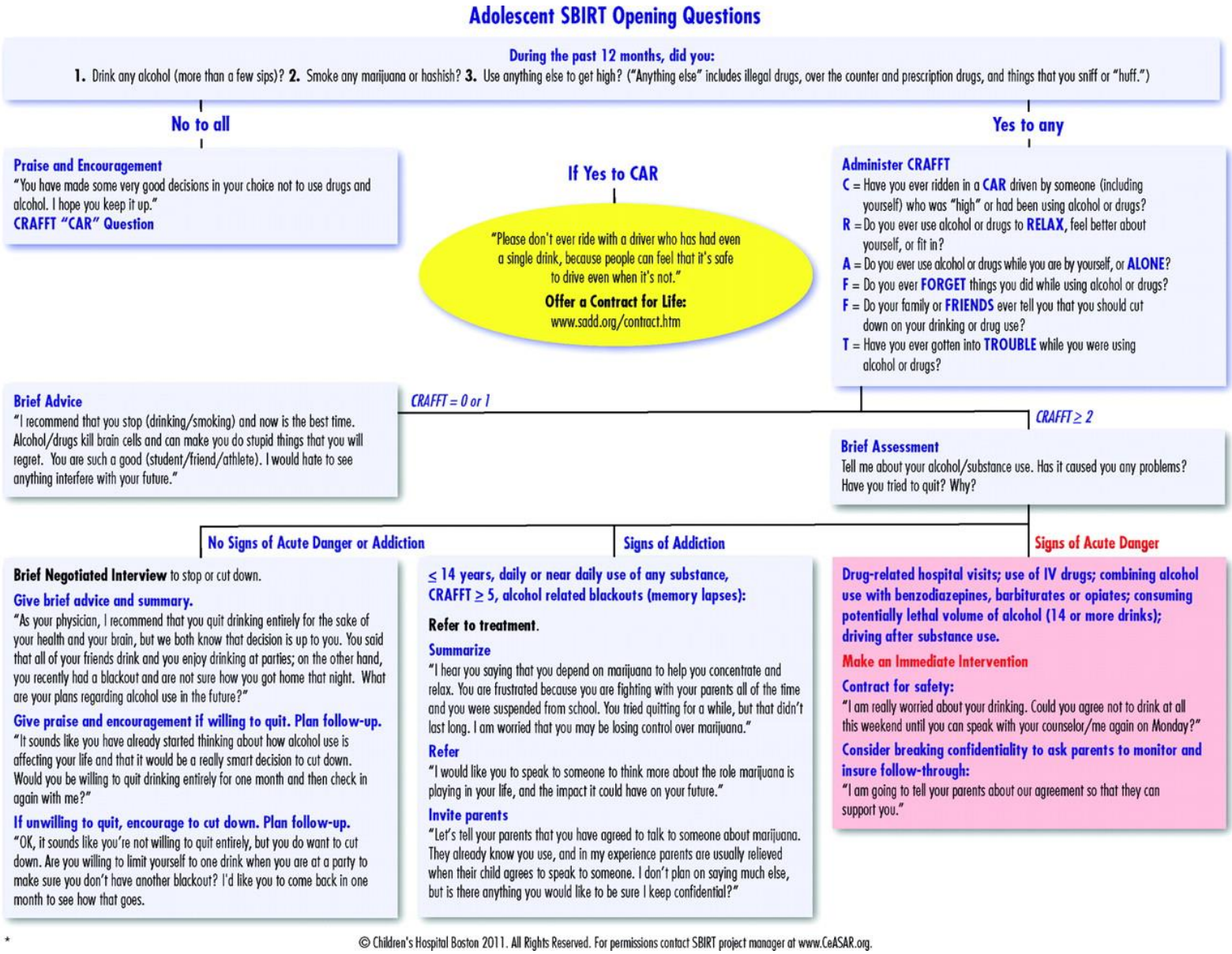
Rating System for the Hierarchy of Evidence For an Interventional Inquiry (Modification by Dr. Lindholm for course N5613)	
Level I	Evidence from a systematic review or meta-analysis of all relevant RCTs. *Evidence-based clinical practice guidelines based on systematic reviews of RCTs). **
Level II	Evidence obtained from well-designed RCT. *Quantitative systematic review of well-designed controlled trial without randomization.*
Level III	Evidence obtained from well-designed controlled trial without randomization *(quasi-experimental).* *Quantitative systematic review of case-control, cohort, or correlational studies.*
Level IV	Evidence from well-designed case-control or cohort study *(or cross-sectional study)*
Level V	Evidence from systematic review of *quantitative* descriptive *(no relationships to examine)* or qualitative studies.
Level VI	Evidence from a single *quantitative* descriptive *(no relationships to examine in the study) or* qualitative study
Level VII	Evidence from the opinion of authorities and/or reports of expert committees

Melnyk, B.M.& Fineout-Overholt., E. (2015). *Evidence-based practice in nursing and healthcare.* Philadelphia Lippincott Williams & Wilkins,.

**Italics, appropriate in this category, modification by LL 2017 based on opinions from experts to place SR at one level higher than single study design level.*

Appendix E

Adolescent SBIRT Algorithm



Appendix F

Conceptual Framework for Adolescent Risk Behavior

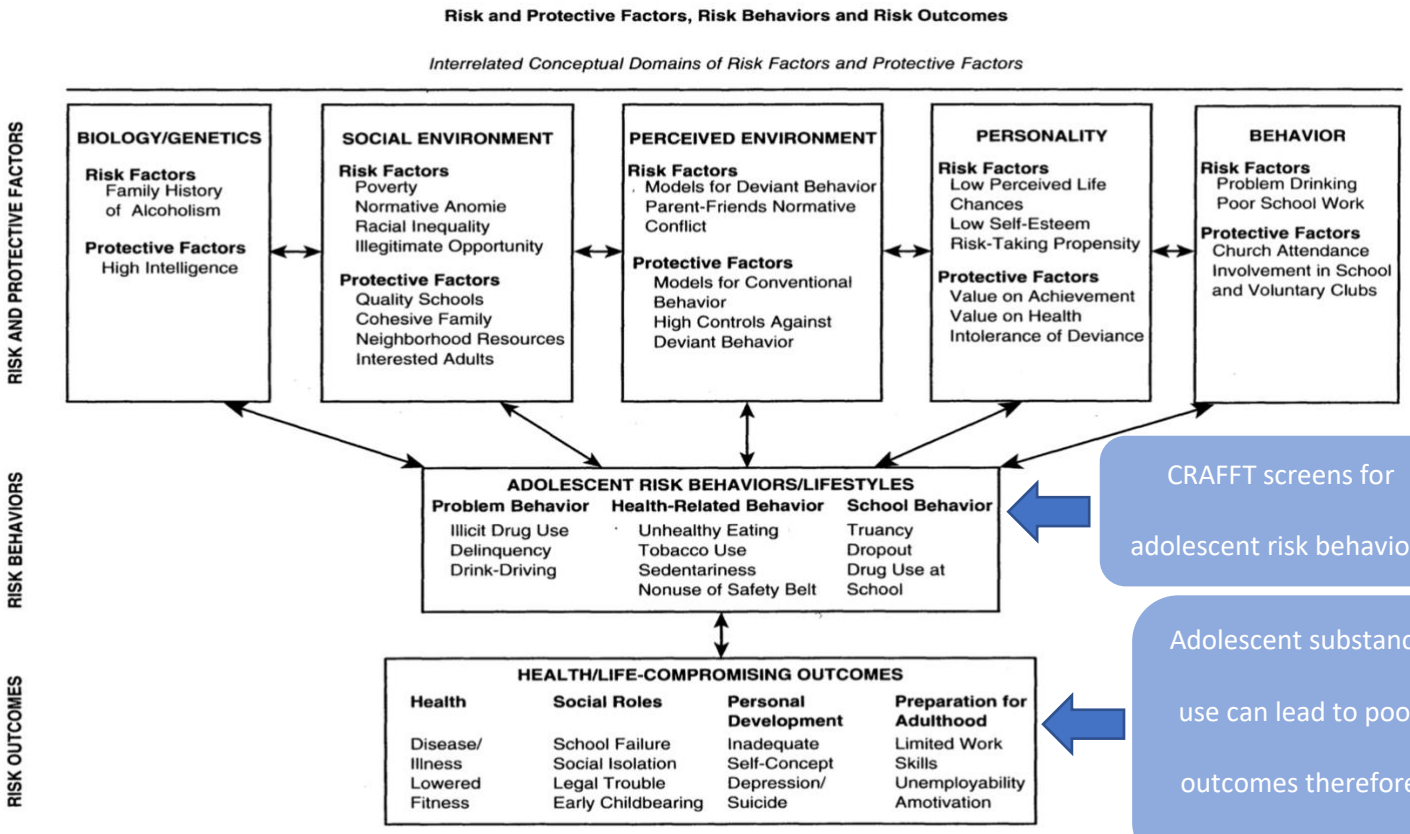


FIGURE 23.3 A conceptual framework for adolescent risk behavior (Jessor, 1991c, p. 602).

CRAFFT screens for adolescent risk behaviors

Adolescent substance use can lead to poor outcomes therefore

Appendix G

Institutional Review Board Letter of Approval

UMKC
Office of Research Services

Principal Investigator: Ms. Janet Wood
6372 S. Farm Rd. 119
Brookline Station, MO 65619

Protocol Number: 18-217
Protocol Title: Improving Identification of Adolescents at Risk for Substance Use Disorders with Standardized Screening Tool
Type of Review: Not Human Subjects Determination

Dear Ms. Wood,

The above referenced study, and your participation as a principal investigator, was reviewed and determined to be Not Human Subjects Research (NHSR). As such, your activity falls outside the parameters of IRB review. You may conduct your study, without additional obligation to the IRB, as described in your application.

The NHSR Determination is based upon the following Federally provided definitions:

is defined by these regulations as "a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge."

The regulations define a as "a living individual about whom an investigator (whether professional or student) conducting research obtains: data through intervention or interaction with the individual, or identifiable private information."

Attachments include the following:
Crouch faculty approval.pdf; IRB Methods Crouch.docx; IRB CRAFFT Screening Tool.docx

All Human Subjects Research must be submitted to the IRB. If your study changes in such a way that it becomes Human Subjects Research, please contact the Research Compliance office immediately for the appropriate course of action.

Please contact the Research Compliance Office (email: umkcirb@umkc.edu; phone: (816)235-5927) if you have questions or require further information.

Thank you,

Cynthia Thompson
UMKC IRB Administrative Office

Appendix H

Budget Table

Julia Crouch: Student Investigator		
Funding Option: UMKC Women's Council Graduate Assistance Fund		
Project start date: 9/20/2018		
Item	**Costs**	**Notes**
Salary – Julia Crouch, Student Investigator	$0.00	Student investigator uncompensated for data collection
RN hourly rate	$35.00/hour	Student investigator uncompensated
Office Supplies	Paper: $12.99/ream (500 sheets) One Black Toner Cartridge: $69.99	Printer paper, printer ink
Project Poster	Fedex Printing: $66.00	UMKC student discount to print project poster at Fedex
Travel Funds	$715	Flight to Little Rock, Arkansas, conference fee, one-night hotel cost
Total project costs	$82.98	

Appendix I

Logic Model

Logic Model foP Project					
Student: Julia Crouch					
Inquiry, PICOTS: In the adolescent (12 to 18 years of age) population does the use of a developmentally appropriate substance abuse screening tool (CRAFFT) compared to not using a substance use screening tool improve the identification of teens at risk for substance use disorders during a six-month period at one outpatient clinic?					
Inputs	**Intervention(s)** **Outputs** *Activities*	*Participation*	**Outcomes -- Impact** *Short*	*Medium*	*Long*
Evidence, sub-topics 1. CRAFFT screening tool 2.Adolescent substance use 3. Screening, brief intervention & referral to treatment (SBIRT) **Major Facilitators or Contributors** 1.Provider education 2. Standardized tool 3. Screen all patients at every well child visit (ages 12-18) 4.Treatment referral options in community **Major Barriers or Challenges** 1. Limited time 2. Limited provider knowledge/training 3. Patient demographics (older patients, males) 4. Patient comorbidities (psychiatric conditions)	**EBP intervention which is supported by the evidence in the Input column** Screen adolescents for substance use with CRAFFT screening tool **Major steps of the intervention** 1. Chart review of previous 3 months for patients referred to substance use treatment 2. Screen eligible patients using CRAFFT 3.Identify those who screen at high risk 4. Compare pre and post data	**The participants** N=100, adolescents age 12-18 years **Site** Public health clinic in Midwest **Time Frame** 3 months **Consent or assent Needed** Yes **Other person(s) collecting data (yes,no)** No **Others directly involved in consent or data collection (yes/no)** No	**(Completed during DNP Project)** **Outcome(s) to be measured** Primary: Identification of teens at high risk for substance use disorders post intervention Secondary: identification of teens at high risk for substance use disorders pre-intervention **Measurement tool(s)** 1. CRAFFT screening tool (score >/=2) 2. Referrals to substance abuse treatment pre-intervention **Statistical analysis to be used** **1.** T-test **2.** Regression analysis	**(after student DNP)** Improve management of teens at risk for substance abuse by referring them to treatment centers. Improve relationships with substance use treatment centers in the community. Increase providers comfort with screening and discussing substance use with adolescents.	**(after student DNP)** **Outcomes that are potentials** Potential long-term outcomes include implementing the entire SBIRT process. This includes educating providers on performing brief interventions.

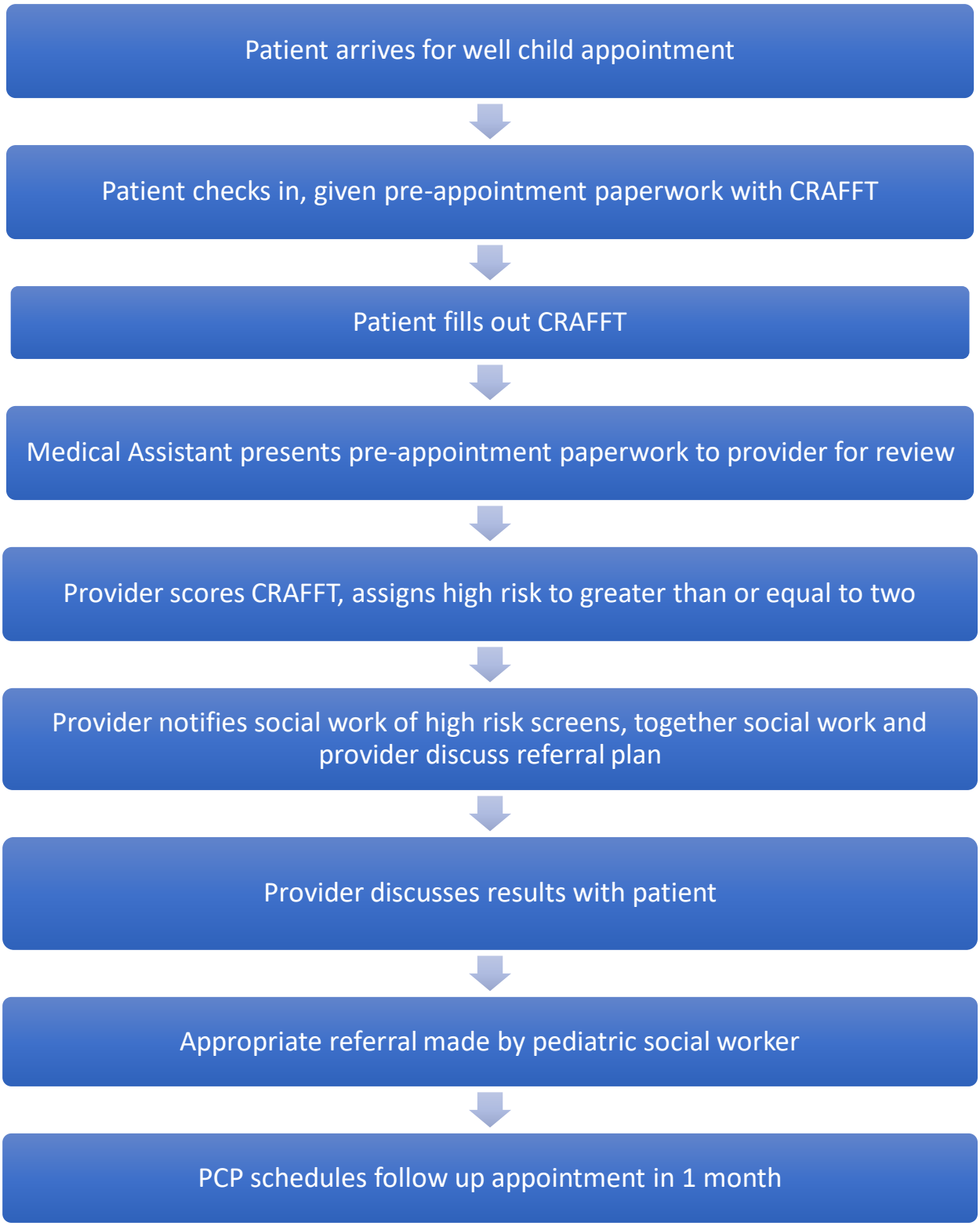
Rev. 7/09, 1/2015 http://www.uwex.edu/ces/lmcourse/interface/coop_M1_Overview.htm Logic-Model

Worksheet content revisions by Lyla Lindholm for DNP Project. Not to be placed on web for public use.

For UMKC DNP coursework only.

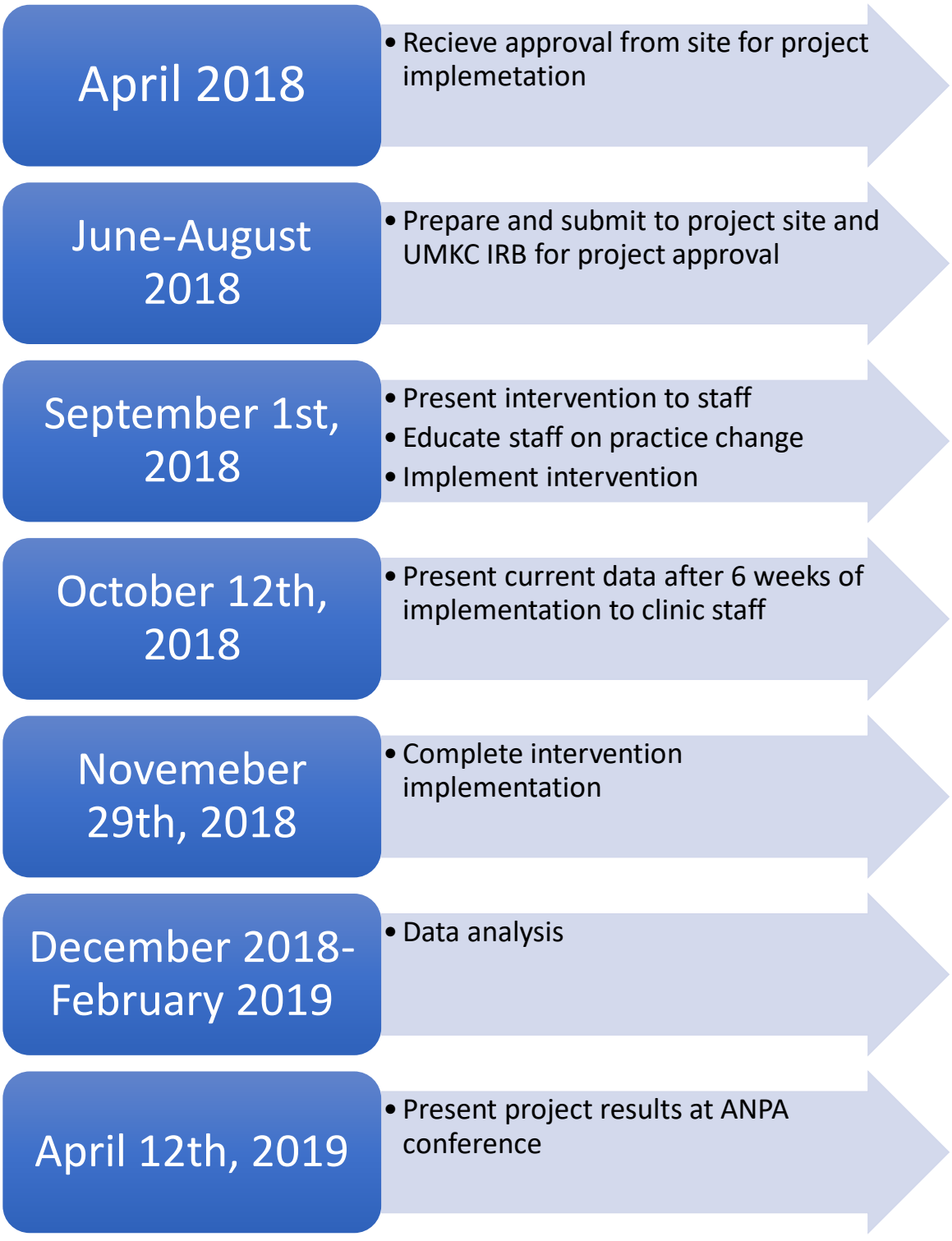
Appendix J

Participant Flow Diagram



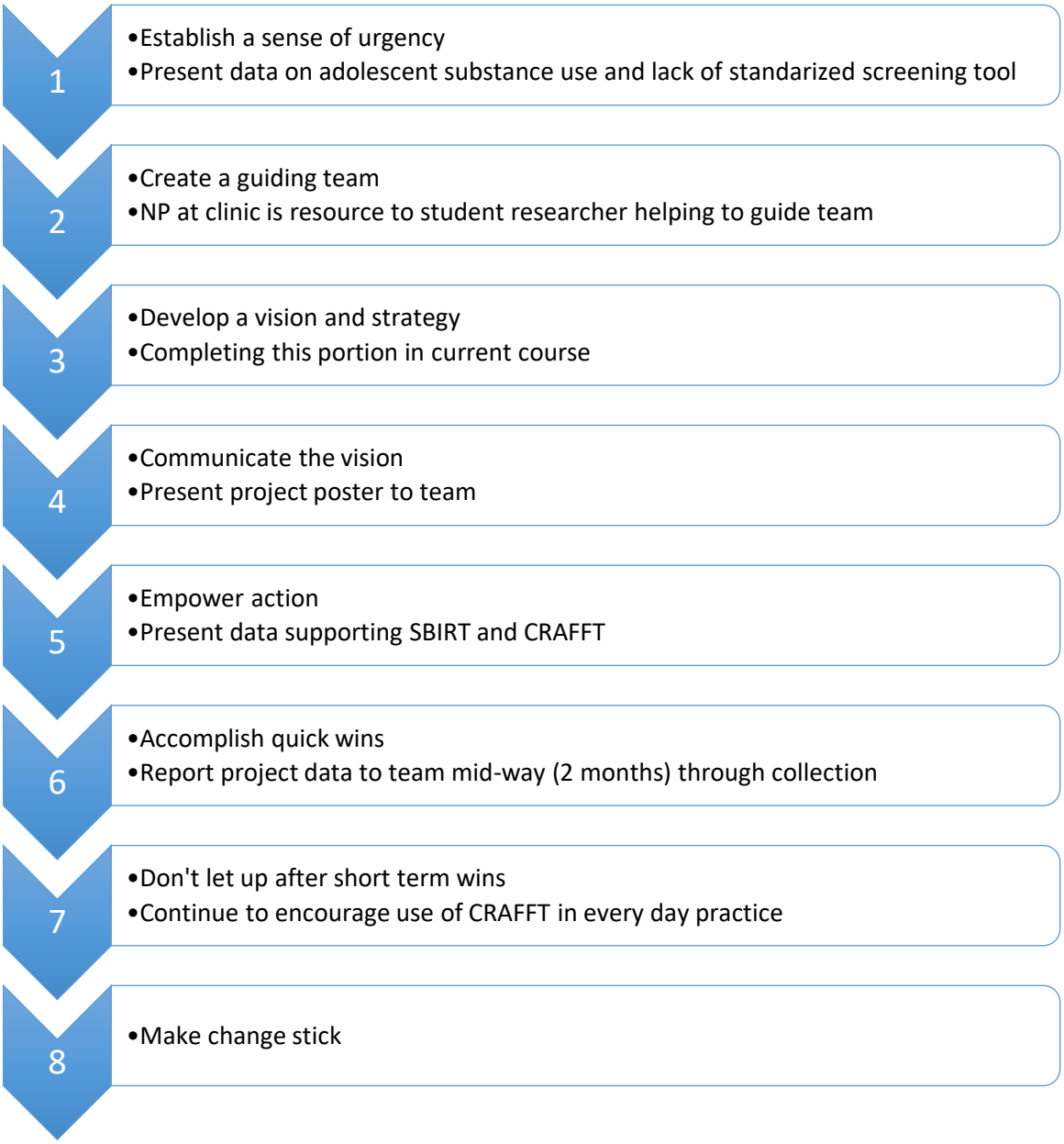
Appendix K

Project Timeline Flow Graphic



Appendix L

Kotter and Cohen's Model of Change



Appendix M

Data Collection Template

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Group	Numeric	8	2	Group	{1.00, Interv...	None	8	Right	Nominal	Input
2	Age	Numeric	8	2	Age	None	None	8	Right	Scale	Input
3	Gender	Numeric	8	2	Gender	{1.00, Fema...	None	8	Right	Nominal	Input
4	Ethnicity	Numeric	8	2	Ethnicity	{1.00, Afric...	None	8	Right	Nominal	Input
5	Parent	Numeric	8	2	Parent	{1.00, Yes}...	None	8	Right	Nominal	Input
6	Referral	Numeric	8	2	Referral	{1.00, Yes}...	None	8	Right	Nominal	Input
7	Went_To_Appt	Numeric	8	2	Went_To_Appt	{1.00, yes}...	None	8	Right	Nominal	Input
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											

	Group	Age	Gender	Ethnicity	Parent	Referral	Went_To_Appt
1							
2							
3							
4							
5							
6							
7							
8							

Appendix N

Statistical Analysis Table

	Intervention Group	Baseline Group
Participants	30	30
Mean Age	14.37	15.08
Gender	M: 16 F: 19	M: 14 F: 21
Race	African American: 27 Caucasian: 4 Hispanic: 3 Other: 1	African American: 24 Caucasian: 9 Hispanic: 0 Other: 2
Number Referred	3	0
Kept Referral Appointment	0	NA

Appendix O

Statistical Analysis Results Table of Referrals

	Value	df	Symptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.134	1	.077		
Fisher's Exact Test				.239	.120

Appendix P

UMKC Doctor of Nursing Practice
EBP Project Scholarly Paper, Guidelines
Final DNP Project

Sections **Description of Content** (proposal content with additional final project content shaded, 25 to 30 pages in body of paper. 100 points)

Title (2 points)* *Word count per APA*	Indicates the population, EBP quality improvement intervention, and measured outcome.	**Included: Y, N, NA, comment** Y
Abstract (5) **Key Terms** *2/3 page, 250-word maximum*	Summarizes the key project components sequentially: introduction of topic indicating significance, purpose, study design, population with number with setting, EBP intervention, outcome(s) measured, results, and implications to nursing or healthcare or impact to society.	Y (8 items)
title heading on 1st page *(1)*	(The support for the reason to do this project.) Introduces the specific problem or system dysfunction.	 Y

Significance (Economic, Policy, Health System) (1)	Provides the current information and evidence about the problem. (economic, policy, and/or health system).	Y
Local Issue (1)	Describes the nature and severity of the problem or system dysfunction within the local project setting.	Y
Diversity Considerations (1) *2 pages for this section*	Presents diversity content associated with the population and/or local project setting.	Y
Problem, Purpose	(The clearly defined problem, purpose of the EBP intervention, and factors for success)	
Problem Statement (1)	States concisely the primary current problem and any secondary problems.	Y
Intended Improvement with Purpose (1)	Identifies the current trigger for the change and why the change is important now. Concludes with primary and any secondary purpose statement(s).	Y Y Y

Facilitators & Barriers (2) *1 page for this section*	Identifies the project facilitators (support systems, stakeholders or shareholders, champions) and the potential barriers to the change. Discusses the project economic component as a facilitator or barrier. Discusses potential factors promoting or inhibiting sustainability of the intervention *during* the project.	Y Y Y
Review of the Evidence **PICOTS (1)** **Search Strategies (1)**	(The existing evidence for this DNP project) States precisely the primary PICOTS and any secondary PICOTS question. Identifies the literature search strategies (broad to focused with direct application to project) including (a) databases, (b) search terms and criteria, and (c) results of search by study design and by level of evidence [Melnyk] with numbers	 Y Y (all items)

Evidence, Sub-Topics or Themes (6) *3-4 pages for this section*	Presents the synthesis and integration of the evidence (studies and guidelines) that support the problem, intervention, and outcome measurement. At least 3 sub-topics with themes with a total minimum of 15 – 20 studies including evidence-based guidelines	Y
Theory (2) *½ page*	Discusses the theory with concepts and addresses application to the project and intervention. Discusses application of the theory in studies similar to the project.	Y Y
Methods **IRB Approval, Site Approval, Ethical Issues,** **Funding (2)**	(The components of the project. Provides information for others to replicate the evidence based change) States specific IRB approval and site agreement.	 Y Y

½ page	Discusses ethical considerations of privacy, protection including research vulnerable population, and author conflicts of interest.	Y
	Addresses management of the ethical concerns.	Y
Setting & Participants (1)	Addresses funding.	Y
½ page	Describes the setting, specifics of the participants with inclusion and exclusion	
EBP Intervention (2)	criteria, sampling method, and expected number.	Y
2 pages	States the EBP intervention.	Y
	Details the intervention steps (recruitment, intervention sequence including time and participant involvement and who conducts) so	
Change Process, EBP (2)	others can replicate.	Y (change) Y (EBP)
½ page	Discusses the change organizational theory with processes to promote change and EBP model or framework to support the project.	Y

Study Design (1) *1/3 page*	Discusses likelihood of sustainability *after* project completion. Identifies the study design for measuring impact of the EBP intervention on primary outcome and any secondary outcomes.	Y Y
Validity (1) *½ page*	Describes aspects of the project that address internal validity (integrity of the data) and external validity (transferability of the intervention).	Y
Outcomes (1) *¼ page*	States the primary outcome and any secondary outcome of the EBP intervention which includes anticipated degree and direction of impact of the EBP intervention on the outcome.	Y Y
Measurement Instrument(s) (2) *½ - 1 page*	Identifies and discusses the instrument to measure each outcome of the EBP intervention including tool validity and reliability. Addresses procedures associated with participant completion of the instrument.	Y Y

Quality of Data (1) *½ page* **Analysis Plan (Statistical) (2)** *½ page*	Discusses permission for use of the instrument. Explains methods to promote quality of data including a) power analysis of number of participants, b) baseline data and post data with time length of data collection, and c) comparison to published benchmark data. Provides statistical methods to draw inferences from the data which includes pre-post data and demographics, if later applies.	Y
Results		
Setting & Participants (5) *1/2 page*	Reports the time frame, setting, and participants involved.	Y
	Describes participant data.	Y
Intervention Course, Actual (5) *½-1 page*	Reports the major components of the intervention and the associated time periods.	Y Y

Outcome Data by Sub-Topic (10) *1 page*	Addresses the number of participants at key points. Presents the data with statistical analysis for each measured outcome. Includes summary of missing data.	Y Y
Discussion **Successes, Most Important (4)** *1/2 page* **Study Strengths (2)** *½-1 page* **Results Compared to**	States and describes the most important successes in the study outcomes. Describes elements of the setting (for example, geography, resources, organizational culture, staff, and leadership) that provided support and context for the intervention. Discusses degree of success in implementing the intervention components.	Y Y Y Y

Evidence in the Literature (2) *1 page*	Compares and contrasts the study results with relevant findings from specific published studies.	
Limitations		
Internal Validity Effects (1)	Discusses possible sources of confounding factors, bias, and imprecision in EBP intervention processes and collection of data that could affect the study outcomes.	Y
External Validity Effects (2)	Address factors (participant characteristics, setting characteristics) that could affect generalizability or transferability of intervention in achieving intended results.	Y Y
Sustainability of Effects and Plans to Maintain Effects (1)	Addresses potential for observed gains to weaken over time and plans for maintaining improvement.	Y
Efforts to Minimize the		

Study Limitations (1) *2-3 pages this section*	Reviews the efforts incorporated into the project to minimize limitation impact on application of results. Assesses the effect of limitations on interpretation and application of findings.	Y
Interpretation		
Expected & Actual Outcomes (2)	Addresses expected results, unexpected results, problems, and failures. Explores possible reasons for differences between observed and expected outcomes.	Y Y
Intervention Effectiveness (inferences) (2)	Draws inferences consistent with the strength of the study data about causal mechanisms (components of the intervention, support context factors, type of setting) that assisted with the intervention's effectiveness. Addresses the types of settings in which the study intervention is most likely to be effective.	Y Y

Intervention Revision (1)	Suggests intervention modifications that might improve attainment of the outcomes.	Y
Expected and Actual Impact to Health System, Costs, and Policy (2)	Highlights the expected impact and the actual impact of the EBP intervention on health system, policy, and cost.	Y
	Reviews study estimated costs and actual cost of the intervention and study.	Y
	Discusses the potential for the economic sustainability of the intervention.	Y
	Discusses current funding sources for the study.	Y
Opportunities, other *2 pages for this section*	As applies, optional.	
Conclusions		
Practical Usefulness of Intervention (2)	Discusses overall practical usefulness of the EBP intervention.	Y

Further Study of Intervention (1) **Dissemination (1)** *1 page for this section*	Addresses further implementation and outcome studies of the EBP intervention. Presents dissemination.	Y Y
References (4)	Presents a minimum of 20 research studies including evidence-based guidelines. All cited within body of paper. May have additional references: e.g., grey literature, professional organization guidelines which may not be derived from high evidence level research, other. Excludes general references such as textbooks. Use primary sources.	Y
Appendices (all cited within body of paper, sequence appendices as introduced in paper) **Cost Table for Project (1)**	Cost table.	Y (cost)

Definition of Terms (1)	Definitions.	Y (terms)
Synthesis of Evidence Table (specific to project) (1)	Evidence table.	Y (table)
Theory to Application Diagram (1)	Theory to Application diagram.	Y (theory)
Logic Model (1)	Logic Model figure.	Y (Logic)
Project Timeline Flow Graphic (1)	Project Timeline graphic.	Y (timeline)
Intervention Flow Diagram (1)	Intervention flow diagram.	Y (intervention)
Intervention Materials (example-education program)	Intervention materials, if applies.	Y (materials)
	IRB Approval.	Y (IRB)

IRB Approval Letter(s)	Consent or information letter, if applies.	
IRB Approved Consent or Informational Letter, if applies		NA (consent)
Measurement Tool(s), if applies	Measurement tools, if applies.	Y (tools)
Permission(s) for Tool(s), if applies	Permission for tool, if applies.	NA (permission)
Data Collection Template (1)	Data Collection template.	Y (collection)
Statistical Analysis Results Table(s) (4)	Statistical analysis results table(s).	Y (results, analysis)
Other Tables		

This checklist completed by student		

*total points = 100 points
** if applies, then must be present to receive paper grade

Appendix Q

Faculty Approval Letter

UMKC School of Nursing and Health Studies

July 13, 2018

UMKC Institutional Review Board
Primary Project Site IRB
UMKC DNP Student

UMKC IRB, Primary Project Site IRB, and DNP Student

This letter serves to provide documentation regarding Julia Crouch's Doctor of Nursing Practice (DNP) Project proposal. Ms. Crouch obtained approval for her project proposal, *Improving Identification of Adolescents at Risk for Substance Use Disorders with Standardized Screening Tool*, from the School of Nursing and Health Studies DNP faculty on July 13, 2018.

If we can provide further information, please feel free to contact us.

Sincerely,

Dr. Cheri Barber

Cheri Barber, DNP, RN, PPCNP-BC, FAANP
Clinical Assistant Professor
DNP Program Director
UMKC School of Nursing and Health Studies
barberch@umkc.edu

Lyla Lindholm, DNP, ACNS-BC
Clinical Assistant Professor
DNP Faculty