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Using Multi-Theory Model to Explain HIV Screening Behaviors Among College-Aged People

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Walden University
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Abstract

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MBA, Brandman University, 2017

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Dissertation Submitted in Partial Fulfillment

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Abstract

There is a need to examine novel approaches that explain the association between the initiation and sustenance of HIV screening behavior. This quantitative, cross-sectional study was used to examine if the components of the multi-theory model (MTM) of health behavior change can explain the initiation and sustenance of HIV screening behavior among college-aged people. A convenience sample of 151 consenting college-aged people between the ages of 18 and 34 in a western US state completed a self-administered 44-item instrument. Multiple regression analysis was used to assess the correlation between the constructs of the multi-theory model of health behavior change (independent variables) and the decision of college-aged people to initiate and sustain HIV screening (dependent variable) as a health behavior change. The results showed that two out of three initiation constructs explained 27.6% of the variance in the behavioral change to initiate HIV testing (adjusted $R^2 = 0.\ 276$, $F\ (7, 143) = 9.173$, $p < 0.001$), and two of three sustenance constructs explained 36.1% of the variance in the behavioral change to sustain HIV testing (adjusted $R^2 = 0.361$, $F\ (7, 143) = 13.130$, $p < 0.001$). Implications for positive social change include justification of the utility of the multi-theory model of health behavior change to build evidence-based health education programs for public health agencies and interventions for primary care practitioners to address the growing incidence of HIV.

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Chapter 1: Introduction to the Study

This study was conducted to examine the components of the multi-theory model of health behavior change as a novel approach to explain initiation and sustenance of HIV screening behaviors in college-aged people. HIV, especially among high-risk populations like college-aged people, is still a public health problem that needs novel techniques that help to prevent transmission. As a result, this study aims to create a foundation for future research to create positive social change that contributes to public health strategies addressing HIV transmission in high-risk populations.

Chapter 1 will include the background and problem statement with a focus on prevalence and currents trends of HIV infection in the United States and the current state of health behaviors related to HIV screening to explain the need for and purpose of the study. In addition, Chapter 1 will provide research questions and hypotheses. Finally, Chapter 1 will begin to build a foundation by discussing the theoretical framework, nature of the study, definitions, assumptions, scope and delimitations, limitations, and significance to describe the gap in the literature and explain the potential positive social change implications of the study.

Background

Approximately 1.1 million people are currently living with HIV in the United States (Center for Disease Control and Prevention [CDC], 2020). However, 1 in 7 of those individuals do not know they have HIV (CDC, 2020). This means that 14% of people living with HIV are unknowingly transmitting the diseases because they did not get screened for HIV. In 2018, there were 37,968 new diagnoses of HIV in the United

States. Although this is a decrease over the last 5 years of 7%, some groups are being disproportionately affected and may have even experienced an increase in new diagnoses (Jones et al., 2019; Mukherjee et al., 2018). Young adults remain the most impacted but not only new HIV diagnoses but failure to get tested (Anwuri et al., 2017; Aydoele, 2017; James et al., 2019). Screening is one of the most effective preventative strategies for new HIV infections (Anwuri et al., 2017).

The Centers for Disease Control and Prevention (2019) recommend the HIV screening is done during routine visits, at least once a year for individuals with risk factors, and at least every 3 or 6 months for members of the LGBT community. However, there are many barriers that do not facilitate an environment or culture to maintain the HIV screening behaviors as recommended by the CDC. Various social and emotional factors not only contribute to intent to initiate HIV screening but can affect sustainability (James & Ryan, 2018; Jones et al., 2017; Kort et al., 2017; Mukherjee et al., 2018; Sen et al., 2017). James and Ryan (2018) suggested that history, as a proxy for potential future sustainability, is mitigated with increased HIV knowledge and decreased perception of a negative stigma. As a result, identifying factors that help individuals initiate and sustain a behavioral change can lead to a health behavior change.

Previous studies only address factors contributing to the intent to initiate HIV screening behaviors. Abamecha et al. (2013), Ayodele (2017) and Kakoko et al. (2006) conducted studies to assess the theory of planned behavior as a predictor of HIV testing within various populations. All three studies found that the constructs of the theory of planned behavior is a predictor of HIV screening intention. Furthermore, James et al.

(2019) and Anwuri et al. (2017) conducted an analysis, using the health belief model as a theoretical framework, to examine determinants that were related to perceived susceptibility to HIV infection and HIV testing intention. However, to facilitate health behavior change, sustainability is necessary. Although, many studies have been conducted analyzing a respondent's intent to initiate HIV screening behaviors or attempt to predict HIV screening behaviors, none have analyzed both initiation and sustenance of HIV screening behaviors among college students.

Problem Statement

The burden of new diagnoses of HIV is highest among college age adults. Young adults from the ages of 15–24 years are among the most risky and vulnerable population of new HIV diagnoses in the United States (Anwuri et al., 2017; Djibuti et al., 2015; James et al., 2019). Although many experts agree that HIV screening and testing is an important part of a strategy to prevent, treat and care for HIV, screening remains low (Anwuri et al., 2017; James et al., 2019). Recent statistics show that 14% or 1 in 7 people have HIV but do not know about it and need testing (CDC; 2020; Minority HIV/AIDS Fund, 2020). Experts suggest that new HIV infection rates have plateaued since 2013 in the United States, because interventions and treatments are not reaching the demographics most at need, this population includes African Americans and Latinos. The Kaiser Family Foundation (2019) reported that California was listed as second in the number of new HIV diagnoses in the United States in 2017. The California Department of Public Health or CDPH (2019) showed that, though major counties such as Los Angeles and San Francisco Counties have steadily decreased the rates of newly

diagnosed HIV infections, some areas with the San Joaquin Valley are experiencing steady increases in the rates of newly diagnosed HIV infections from 2013 to 2017. In addition, approximately 50% of all new diagnoses of HIV in California occurred in individuals from the age of 18 to 34 (CDPH, 2019). As a result, HIV is still a major problem in California that needs to be addressed.

Broadening screening opportunities to include areas and individuals that need it most is important. However, to create an intervention to increase screening in high-risk areas, studies should be conducted to identify what would be predictive of increased intent to get HIV tested and sustain testing in the future. This study used the multi-theory model of health behavior change to predict HIV screening behaviors among college students in the San Joaquin Valley of California. The fourth-generation approach using multi-theory model of health behavior change is meant to create an instrument aimed at improving the predictability of HIV screening behavior change among college-aged people. Previous studies have examined only the intent to get HIV screening (Abamecha et al., 2013; Ayodele, 2017; Kakoko et al., 2006) and reviewed qualitative metrics that might affect sustainability (James & Ryan, 2018; Jones et al., 2019; Kort et al., 2017; Mukherjee et al., 2018; Sen et al., 2017), or initiation of HIV screening (James et al., 2019); however, each have mixed results as it relates to predictability. This study was conducted to improve predictability, by using the multi-theory of health behavior change, of HIV screening behavior change among college-aged people.

Purpose of the Study

The purpose of this quantitative, cross-sectional study was to examine how the

constructs of the multi-theory model of health behavior change (independent variables) predict the behavior change of college-aged people in initiating and sustaining HIV screening behavior (dependent variable) as a lifestyle modification, while controlling for demographical factors like age, gender, educational background, and work status in the areas of investigation. A multivariate analysis was used to assess the correlation between the constructs of multi theory model for behavior change (independent variables) and the decision of college-aged people to initiate and sustain HIV screening (dependent variable) as a health behavior change.

Research Questions and Hypotheses

RQ 1: Are the constructs of multi-theory model of health behavior change—participatory dialogue, behavioral confidence, changes in the physical environment (independent variables)—associated with the decision of college-aged people to initiate HIV screening (dependent variable) while controlling for demographical factors like age, gender, educational background, and work status?

$H_0$1: The constructs of multi-theory model of health behavior change—participatory dialogue, behavioral confidence, changes in the physical environment (independent variables)—are not associated with the decision to initiate HIV screening (dependent variable) by college-aged people when controlling for demographical factors like age, gender, educational background, and work status.

H_a1: The constructs of multi-theory model of health behavior change—participatory dialogue, behavioral confidence, changes in the physical environment (independent variables)—are associated with the decision to initiate HIV screening

(dependent variable) by college-aged people when controlling for demographical factors like age, gender, educational background, and work status.

RQ 2: Are the constructs of multi-theory model of health behavior change—emotional transformation, practice for change and changes in the social environment (independent variables)—associated with the decision of college-aged people to sustain HIV screening (dependent variable) while controlling for demographical factors like age, gender, educational background, and work status?

$H_0$2: The constructs of multi-theory model of health behavior change—emotional transformation, practice for change and changes in the social environment (independent variables)—are not associated with the decision to sustain HIV screening (dependent variable) by college-aged people when controlling for demographical factors like age, gender, educational background, and work status.

H_a2: The constructs of multi-theory model of health behavior change—emotional transformation, practice for change and changes in the social environment (independent variables)—are associated with the decision to sustain HIV screening (dependent variable) by college-aged people when controlling for demographical factors like age, gender, educational background, and work status.

Theoretical Framework

Theoretical frameworks are the core of the iterative process in the cycle of discovery. Discovery leads to a study formulating subsequent research questions (Salazar et al., 2015). Theory is a systematic view of interrelated constructs developed with the purpose of explaining and predicting phenomena that occur in life (Glanz, 2015). The

integration of theory develops a cohesive relationship between the main aspects of a study (Grant & Osanloo, 2014). The theoretical framework is used as a grounding base not only to help explain or predict a phenomenon but to formulate future studies.

Multi-Theory Model of Health Behavior Change

The multi-theory model of health behavior change was the theoretical framework. The multi-theory model of health behavior change was developed by Sharma (2015) to provide a new theory of health behavior change. The health belief model, transtheoretical model, PRECED-PROCEED model, and the ecological models, which are commonly applied in health education and health promotion, have limitations in predictive power and malleable constructs that induce immediate and long-term health behavior change across cultures, individuals, groups, and communities (Sharma, 2015; Sharma, 2017). The multi-theory model of health behavior change consists of two main components the initiation component and the sustenance component, each with three constructs.

Initiation

The initiation component focuses on short-term behavioral change. Sharma (2015) posited that three main constructs influence the initiation of a health behavior change. The first consists of participatory dialogue, where a two-way dialogue occurs that focuses on the advantages and disadvantages of health behavior change. This construct is derived from the elements of the transtheoretical model and health belief model that focus on pros or perceived benefits and cons or perceived barriers. However, neither model considers the participatory part, which occurs in a two-way communication. This

element of participatory dialogue is derived from Freire's model of adult education. Integration of multiple elements from three theoretical models helps to build a more robust construct meant to be applicable across individuals, groups, and communities.

The second health behavior change initiation construct is behavioral confidence. This construct is derived from aspects of Ajzen's theory of planned behavior and Bandura's social foundations of thought and action. More specifically, the combination of Ajzen's element of perceived behavior control and Bandura's element of self-efficacy helps to create a construct that accounts for external sources and their impact on future health behavior change (Sharma, 2015). These elements factor in culturally specific variables that may build a more universal theoretical framework.

The third health behavior change initiation construct is changes in the physical environment. This construct is derived from aspects of Bandura's social foundation of thought and action, Prochaska's systems of psychotherapy, and Fishbein's integrative model for behavioral prediction. More specifically, Bandura's element of environment, Prochaska's element of environmental re-evaluation, and Fishbein's element of environmental factors helps to conceptualize the obtainability, availability, accessibility, convenience, and readiness of resources to make change (Sharma, 2015). These elements factor in differences in environment to account for malleability within the theoretical construct. As a result, participatory dialogue, behavioral confidence, and physical environment facilitate opportunities to initiate change, however, do not account for sustained health behavior change.

Sustenance

The sustenance component of the multi-theory model of health behavior change focuses on long-term behavioral change. Sharma (2015) posited that three main constructs influence the sustainability of a health behavior change. The first consists of emotional transformation, where an individual converts their emotions into energy focused on achieving their desired health behavior change. This construct is derived from elements of Goleman's emotional intelligence theory. More specifically, Goleman's element of self-motivation is used to redirect one's feelings toward a goal. This element factors in the components of an individual that helps them translate their behaviors from a short-term action to long-term actions.

The second health behavior change sustenance construct is practice for change. Practice for change is when an individual continually thinks about the health behavior change, which consists of reviewing and changing strategy to overcome barriers and remain focused on the desired outcome (Sharma, 2015). This construct was derived from elements of Freire's adult education model. More specifically, Freire's element of praxis, which means active reflection, guides an individual to remember why and how they are accomplishing their goal to achieve a health behavior change. As emotional transformation helps to transition from short-term to long-term behaviors, practice for change encourages continued change for long-term success.

The third health behavior change sustenance construct is changes in the social environment. The construct was derived from elements of Prochaska's systems of psychotherapy, House's work, stress, and social support, and Bandura's social

foundations of thought and action. More specifically, Prochaska's element of helping relationships, House's element of social support and Bandura's construct of environment (Sharma, 2015). As the first two constructs may be addressing elements of the individual self, the third construct addresses external elements, such as social forces, that may encourage or inhibit continued change.

Sharma tested the constructs of multi-theory model of health behavior change. Areas of study consist of portion size consumption in college students (Sharma et al., 2016), alcohol and drug education (Sharma et al., 2017; Hayes et al., 2017; Sharma et al., 2018), physical activity (Sharma et al., 2016; Knowlden & Sharma, 2016; Stephens et al., 2018; Hayes et al., 2018), smoking cessation (Sharma et al., 2017; Patel et al., 2018) and more. However, additional research can be done to continue developing this theory, especially within populations where health behavior change continues to be elusive. One gap in the literature was the use of the multi-theory model of health behavior change to predict HIV screening behaviors in college-aged people.

Nature of the Study

This study involved a quantitative approach with a cross-sectional study design to assess if the constructs of multi-theory model of health behavior change (independent variables) influence the decision of college-aged people to initiate and sustain HIV screening behaviors (dependent variable) while controlling for demographical factors like age, gender, educational background, and work status. The population consisted of college-aged people in the Central Valley, also called the San Joaquin Valley, of California. I recruited a convenience sample of participants aged 18 – 34. A 44-item self-

administered questionnaire, that has been face and content validated, was administered through Qualtrics where respondents can anonymously reply to the survey. Data were not collected until the Walden University Institutional Review Board approved and informed consents were completed. A multiple linear regression analysis was used to assess the correlation between the constructs of multi-theory model for behavior change (independent variables) and the decision of college-aged people to initiate and sustain HIV screening (dependent variable) as a health behavior change. The minimum sample size ($N = 103$) was determined using G* Power based on a medium effect size (0.15), standard power (0.80), and the number of predictors (seven). The calculation resulted in recruitment of 151 consenting participants that meet the inclusion criteria to ensure the study meets quality metrics.

Definitions

Age: Tracked as a continuous variable. Age was requested as of the time the respondent completed the questionnaire.

Behavioral confidence: The behavioral confidence construct uses a five-scale item to measure the willingness of participants to get HIV testing (1) this week, (2) this week despite being busy, (3) this week despite costs, (4) this week without getting frustrated, and (5) this week despite any fears. The possible responses are: *Not At All Sure* (0), *Slightly Sure* (1), *Moderately Sure* (2), *Very Sure* (3), and *Completely Sure* (4). The sum of the behavioral confidence construct metrics ranges from 0–20. A high score is associated with the likelihood of initiating a behavioral change to get an HIV test.

Changes in physical environment: The changes in physical environment construct

uses a three-item scale to measure the change in the physical environment by assessing if a participant will (1) have resources to get HIV testing this week, (2) be able to find a place to get HIV testing this week, and (3) have opportunity to get HIV testing this week. The likely responses to the above items were the following: *Not At All Sure* (0), *Slightly Sur*e (1), *Moderately Sure* (2), *Very Sure* (3), and *Completely Sure* (4). The sum score of the changes in physical environment construct metrics ranges from 0-12. A high score is associated with the likelihood of initiating a behavioral change to get an HIV test.

Changes in social environment: The changes in social environment construct uses a three-item scale to measure the certainty of participants to get the help of a: (1) family member to support you with getting HIV testing every year, (2) friend to support you with getting HIV testing every year, and (3) health professional to support you with getting HIV testing every year. The likely responses to the above items were the following: *Not At All Sure* (0), *Slightly Sure* (1), *Moderately Sure* (2), *Very Sure* (3), and *Completely Sure* (4). The sum score of the changes in social environment construct metrics ranges from 0–12. A high score is associated with the likelihood of sustaining a behavioral change to get a HIV test.

Educational background: The educational background variable uses a two-item scale to determine participants': (1) class and (2) GPA. The likely responses for class were the following: (1) *Freshmen*, (2) *Sophomore*, (3) *Junior*, (4) *Senior*, (5) *Graduate* and (6) *Not currently enrolled in college*. The likely responses for GPA were the following: (1) *less than 2.49*, (2) *2.50–2.99*, (3) *3.00–3.49*, (4) *3.50–4.00*.

Emotional transformation: The emotional transformation construct uses a three-

item scale to determine what and how participants: (1) direct emotions/feelings toward the goal of getting HIV testing every year, (2) motivate yourself toward getting HIV testing every year, and (3) overcome self-doubt in accomplishing the goal of getting HIV testing every year. The likely responses to the above items were the following: *Not At All Sure* (0), *Slightly Sure* (1), *Moderately Sure* (2), *Very Sure* (3), and *Completely Sure* (4). The sum score of the emotional transformation construct metrics ranges from 0–12. A high score is associated with the likelihood of sustaining a behavioral change to get a HIV test.

Gender: A categorical variable that included male, female, and other. Designation as other was asked to provide further specification.

Initiation of getting a HIV test: Initiation of getting a HIV test component serves as a dependent variable in this study. The component uses a one-item scale to determine the likelihood of participants will get HIV testing in the upcoming week. The likely response to the above item is the following: *Not At All Likely* (0), *Somewhat Likely* (1), *Moderately Likely* (2), *Very Likely* (3), and *Completely Likely* (4). The sum score of the initiation of getting a HIV test component metric ranged from 0–4.

Instrument: Refers to the multi-theory model of health behavior change structured questionnaire used as the tool to gather data (information) from the research participants.

Practice for change: The practice for change construct uses a three-item scale to determine the likelihood that participants would: (1) keep a self-diary to monitor getting HIV testing every year; (2) be able to get HIV testing every year if you encounter barriers; and (3) change your plan for getting HIV testing every year if you face

difficulties. The likely responses to the above items were the following: *Not At All Sure* (0), *Slightly Sure* (1), *Moderately Sure* (2), *Very Sure* (3), and *Completely Sure* (4). The sum score of the practice for change construct metrics ranges from 0–12. A high score is associated with the likelihood of sustaining a behavioral change to get a HIV test.

Participatory dialogue: The participatory dialogue construct uses a ten-item scale, where five-item scales determine the disadvantages or negative outcomes and five-item scales determine the advantages or positive implications to initiate getting a HIV test. The participatory dialogue construct measures the advantageous of getting a HIV test by determining if participants might be able to: (1) have peace of mind, (2) detect the disease early, (3) develop satisfying relationships, (4) feel good about yourself, and (5) be satisfied with your life. The participatory dialogue construct measures the disadvantages of getting a HIV test by determining if participants might (1) have to make a change which you may not like, (2) feel inconvenienced, (3) have to bear costs, (4) discover that you have HIV, and (5) feel that others disapprove of you. The likely responses to the above items were the following: *Never* (0), *Almost Never* (1), *Sometimes* (2), *Fairly Often* (3), and *Very Often* (4). The sum score of the participatory dialogue construct metrics ranges from 0–20. However, the participatory dialogue construct is scored by subtracting the score of the disadvantage's metric from the advantages metric. As a result, the participatory dialogue score can range from -20 to +20.

Sustenance of getting a HIV test: Sustenance of getting a HIV test every year from now on serves as a dependent variable in this study. The component uses a one-item scale to determine the likelihood that participants get HIV testing every year from now

on. The possible responses were rated on the following scale: *Not At All Likely* (0), *Somewhat Likely* (1), *Moderately Likely* (2), *Very Likely* (3), and *Completely Likely* (4). The sum score of the sustenance of getting a HIV test component metric ranged from 0–4.

Work status: A categorical variable that will include a dichotomous response to the question "Do you work for wages?"

Assumptions

Each approach to research has a set of assumptions that guide analysis and future implications of findings. The quantitative research approach that uses a cross-sectional study design is used to for population-based surveys to assess prevalence of outcomes or exposures. These studies are often one-time measurements within the populations and cannot assess causal relationships (Setia, 2016a). However, odds ratios and logistic regression models can be used to assess the association between exposure and outcomes (Setia, 2016a). As a result, I was able to examine the association between the components of multi-theory model of health behavior change and HIV screening behaviors among college-aged people. Future studies may include an experimental design that will contribute to the potential predictability of the components of multi-theory model of health behavior change and HIV screening behaviors among college-aged people.

Scope and Delimitations

The delimitation of this study is the inclusion criteria of college-aged people, aged 18–34. I recruited a convenience sample of participants. A 44-item self-administered questionnaire, that has been face and content validated, was administered through

Qualtrics where respondents could anonymously reply to the survey. Given the sample is a convenience sample of college-aged people located in the San Joaquin Valley of California, this study will not be generalizable outside of this area.

Limitations

In any study design there are limitations that must be addressed. For cross-sectional study designs, the exposure and outcome are often assessed at the same time, which limits the ability to assess a temporal relationship between the outcome and exposure (Solem, 2015). The study design is also susceptible to potential recall bias (Choi et al., 2020), if the respondent cannot remember if they have ever been tested for HIV. In addition, social desirability bias is a tendency for people to be reflected in a positive way to society, meaning survey responses may be skewed among people who have never received an HIV test but feel it is more socially acceptable to respond that they have (Holden & Passey, 2019). If researchers anonymize the study, social desirability bias could be reduced. However, a limitation to conducting anonymous survey could lead to missing data or conflicting responses within the same survey that a researcher cannot follow up (Salazar, 2015). As a result, there is a potential for greater response bias due to a potential lack of understanding and in ability to follow up. Researchers can assess the reading level of their questions to increase understanding of the survey.

Another limitation of a survey-based study is response rates leading to sampling bias. Using a convenience sample could lead to a low sample collected due to poor response rates or a sample bias where the responses collected are from a sample that is

not representative of the population. However, there are steps to mitigate this bias through better survey design by keeping the survey short and accessible or during analysis by using post-survey adjustment techniques (Turk et al., 2019).

Significance

Significance to Theory

The multi-theory model of health behavior change is still a relatively new model. I assessed the impact of the constructs of the multi-theory model of health behavior change on college-aged people' decision or intention to get and continue to get HIV testing. The importance of this study was supported by epidemiological trends that show college-aged people at the greatest risk of being positive for HIV but not being tested (Minority HIV/AIDS Fund, 2020). This study will add to the body of knowledge to further validate the multi-theory model of health behavior change as it pertains to understanding factors associated with behaviors and attitudes toward change in health behaviors. In addition, the predictive elements of this study can guide future research and change practice.

Significance to Practice

Promoting health behavior change in college-aged people who do not get tested for HIV is significant, as it pertains to the growing number of new HIV infections in the San Joaquin Valley. The CDPH indicated that young adults ages 18–34 make up the majority of new cases in California (CDPH, 2019). In addition, although major counties experience a decline in their new HIV infection rates, the San Joaquin has experienced year over year increases in new HIV infection rates. As a result, practice changes are

needed, especially interventions that are more aligned with the needs of college-aged people in the San Joaquin Valley. Interventions conducted in larger population centers have been successful in decreasing rate, but those interventions are not translating to a different population. The use of the multi-theory model for health behavior change can help provide a predictive model to facilitate future interventions for research, however social change needs to occur to make this possible.

Significance to Social Change

HIV has been researched with the goal of finding ways to address this global epidemic. Interventions have been created and implemented, and some areas may receive funding to integrate HIV screening and health behavior change programs and education. But the San Joaquin Valley is often under-resourced due to the major population centers to the north (San Francisco) and the south (Los Angeles). In many ways the San Joaquin, a rural, agricultural hub, is also different from these industrialized areas. As a result, different interventions and different approaches to health education and promotion must be integrated to address the specific population. Walden's (2020) 2017 social change report seeks to leverage research and networks through connecting student and faculty research. This study integrates ongoing faculty research on the components of the multi-theory model of health behavior change and the social needs of the student population. This study provides information pertinent to developing relevant interventions. This study can lead to an interventions and health promotion and education opportunities that help the rates of new HIV infections reverse course in the San Joaquin Valley.

Summary

HIV remains a significant public health concern, especially among young adults. However, HIV screening is an effective preventative strategy to reduce transmission. As a result, novel techniques to address HIV screening behaviors among college-aged people can provide positive social change. Using a quantitative, cross-sectional study design, I assessed the constructs for the multi-theory model of health behavior change to explain HIV screening behaviors among college-aged people. This approach can have significant social change impacts by creating a foundation for future research that can predict and develop interventions to increase HIV screening behaviors and reduce HIV transmission among college-aged people in the San Joaquin Valley of California.

In the next chapter, a review of the literature was conducted to assess the current literature, identify the gaps in the literature, review a novel theoretical approach to health behavior change, and discuss how the multi-theory model of health behavior change addresses gaps in the current literature of HIV screening behavior. In addition, Chapter 2 will examine the impact of demographic and socioeconomic variables, which includes interpersonal and environmental factors, that contribute to HIV screening behaviors among college students.

Chapter 3 will explain the research design and rationale, methodology which includes discussion on instrumentation, and threats to validity. Chapter 4 will report the findings, results, applicable data analysis. Finally, Chapter 5 will interpret the findings, limitations, recommendations, and conclusions and implications for positive social change of the study.

Chapter 2: Literature Review

Within this chapter, information and findings closely related HIV screening behaviors are shared, a discussion about the ongoing dialogue and gaps in the literature will be addressed, and a framework that highlights the importance of this study to social change will be developed. This chapter will approach literature in two ways. The first will be a review of a relatively new theoretical framework, the multi-theory model of health behavior change, as a potential approach to analyzing the initiation and sustainability of HIV screening behaviors among college-aged people. In addition, this chapter will strengthen the argument for a different approach to HIV screening, as compared to past and current literature, and an analysis of alternative theories will be conducted to discuss the limitations of their approaches. The second part is a review of literature to provide an understanding of the current global challenges of HIV and the impact of HIV screening on transmission. In addition, gaps in the current literature will be assessed as it pertains to the relationship between HIV screening behaviors among college-aged people.

Literature Search Strategy

The search strategy adopted for this review focused on the behavior being reviewed, the demographic of interest, and location. The behavior being reviewed, HIV screening behaviors was searched using the keywords *HIV screening* or *HIV testing* and *behavior*. The demographic of interest, college-aged people, was searched using *college students* or *university students*. Finally, the search contained keywords *USA* or *United*

States or *America* or *us* or *United States of America*. The combination of these keywords generated 210 published articles from 1988 to 2020.

To narrow the articles that were most relevant to the current literature review, additional filters were added to pull articles published during a certain timeframe and from academic, peer-reviewed journals. As a result, the articles were filtered for dates of publication from 2015 to 2020. In addition, databases such as MEDLINE with Full Text, CINAHL Plus, and APA PsycInfo were used to find relevant articles. These additional filters reduced the number of relevant articles to 20 published articles from academic, peer-reviewed journals. In addition, a search for publications and presentation on multi-theory model of health behavior change generated 87 results that were published from 2015 to 2021.

Theoretical Framework

Interventions that are focused on health behavior change must be grounded in a firm understanding of theories associated with health behavior change (Glanz et al., 2008). Health behaviors are centered around three main foci: (a) maintenance of health, (b) restoration of health, and (c) improvement of health (Sharma, 2017). Humans act with the intention of achieving these foci, regardless of whether those actions will eventually lead to the result. Therefore, shaping understanding of health and impact of health behaviors through interventions helps to align actions in a way that has a higher potential of achieving these goals. For example, HIV screening behaviors help to maintain, improve, and even restore health. However, some people choose not to engage in HIV screening behaviors for various reasons associated with one or all the three main foci.

These reasons can be associated with various theoretical frameworks such as health belief model, transtheoretical model, theory of planned behavior, and social cognitive theory. Each of these theories has certain strengths and limitations, which will be discussed in this chapter. However, examining the utility of the constructs proposed in the multi-theory model of health behavior change on the decisions of college-aged people to initiate and sustain HIV screening behaviors, as recommended by the CDC, will bring a new approach to a current phenomenon.

Multi-Theory Model

The multi-theory model of health behavior change was developed by Sharma (2015) using a combination of existing and tested theories to form a framework that examines the initiation and sustenance of health behavior change. Examining both constructs in a single theory is a relatively novel approach, as many other models only approach initiation or sustenance (Sharma, 2015). In the development of this approach, Sharma proposed application of the new theory and applied in current research on physical activity (Nahar et al., 2016; Sharma, 2017b; Sharma & Nahar, 2018; Sharma et al., 2020), health eating behaviors (Brown et al., 2019; Brown et al., 2020; Dokun-Mowete, 2017; Dokun-Mowete et al., 2019; Sharma et al., 2016; Sharma, Catalano, et al., 2017;Williams, 2020), tobacco cessation (Sharma, Khubchandari, & Nahar, 2017), substance abuse (Claros et al., 2020; Sharma, 2016; Sharma, Knowlden, & Nahar, 2017), and HPV vaccinations (Asare et al., 2020; Sharma et al., 2017). In addition, the multi-theory model of health behavior change has been used when studying behaviors among college students on multiple occasions (Nahar et al., 2016; Sharma et al., 2016; Sharma,

Knowlden, & Nahar, 2017; Sharma et al., 2017d; Sharma et al., 2020). As a result, the multi-theory model of health behavior change is a relevant framework that could have an impact on future research for the initiation and sustenance of HIV screening behaviors among college-aged people. In the following sections, discussion of the two theoretical components of initiation and sustenance will be provided to build the rationale for the use of the multi-theory model of health behavior change in this study's examination of HIV screening behaviors among college-aged people.

Initiation Component of Multi-Theory Model of Health Behavior Change

Sharma (2015) proposed that the constructs for initiation of behavior change are different from the construct for sustenance of behavior change. As a result, it is important to review the impact of these constructs separately. Initiation is defined as an individual's adoption of a one-time behavior (Sharma, 2015, 2017). A relevant example to this study would be an individual's choice to get tested for HIV, which is influenced by three constructs: participatory dialogue, behavioral confidence, and changes in the physical environment.

Participatory Dialogue

Participatory dialogue is a concept that is derived from and fills in gaps for multiple theories (Sharma, 2015, 2017). Participatory dialogue is a derivative of Freire's model of adult education but serves a similar function to the perceived benefits and perceived barriers of health belief model and pros and cons of transtheoretical model. However, the two-way communication portion of participatory dialogue fills in gaps left by the transtheoretical model and health behavior model. Participatory dialogue can be

initiated by a health educator or health care professional, but it is important that the dialogue is a mutual exploration of behavior change. For example, health educators may begin a dialogue about the benefits of getting screened for HIV and provide information on how to access these resources. However, it is important for the recipient of this information to be engaged and ask questions. This style of dialogue is structured to develop behavioral confidence and increase the likelihood of initiation.

Behavioral Confidence

Behavioral confidence is the second construct of the initiation component of the multi-theory of health behavior change. Building on Bandura's concept of self-efficacy and Ajzen's concept of perceived behavioral control, behavioral confidence is the projection of an individual's sureness to perform a health behavior change in the future (Sharma, 2015, Sharma, 2017). The concept behind behavioral confidence is that health behavior change needs to be seen as a longitudinal experience and not something measured or assessed in the present. As a result, examining an individual's confidence to initiate behavioral change in the future provides greater predictive power (Sharma, 2015). Behavioral confidence requires concrete planning. A relevant example for HIV screening would be to provide information on HIV screening services and benefits, via the participatory dialogue, then scheduling an appointment for the individual to get screening. Setting a start date or initiation date with an appointment generates a concrete plan. This then builds upon the final construct of initiation, which is changes in the physical environment.

Changes in the Physical Environment

The final construct of the initiation component for the multi-theory model of health behavior change is changes in the physical environment. Sharma (2015) defined changes in the physical environment as making changes to the obtainability, availability, accessibility, convenience, and readiness of resources. The construct of changes in the physical environment was built on the constructs of environment from Bandura, construct of environmental re-evaluation from Prochaska, and environmental factors from Fishbein's integrative model. A relevant example of changes in the physical environment can be built on the previous two constructs. In the example where a health educator engages in participatory dialogue about the benefits of HIV screening and provides details to increase behavioral confidence by scheduling an appointment at a place that is accessible and convenient for the participant ensures that the resources are available. As a result, all three constructs when combined facilitate a framework that can be used to predict initiation of health behaviors such as HIV screening among college-aged people. However, initiation is only half of the model associated with longitudinal health behavior change. Sustenance is an important follow up after initiation.

Sustenance Component of Multi-Theory Model of Health Behavior Change

The multi-theory model of health behavior change does not just focus on elements associated with the initiation of a health behavior change but also the longitudinal modification of health behaviors or sustenance. Sustenance is the second component within the multi-theory model of health behavior change. A relevant example to this study would be an individual's choice to continue getting tested for HIV at a frequency

that is suggested by the CDC depending on their risk levels. Sustenance is influenced by three constructs: (a) emotional transformation, (b) practice for change, and (c) changes in the social environment.

Emotional Transformation

Derived from the self-motivation construct of emotional intelligence theory, emotional transformation is the act of an individual directing their emotions toward health behavior change (Sharma, 2015, 2017). The concept around emotional transformation is using energy from negative emotions or actions, such as self-doubt or impulsiveness, and directing it toward a positive emotion or action. A relevant example would be centered around findings that a common deterrent for HIV screening is fear of an HIV positive test (Jones et al., 2019; Kort et al., 2017). As a result, an individual should use the fear of receiving an HIV positive test to compel or encourage them to receive HIV screening. This requires an emotional transformation into fear for oneself to fear the possibility of transference if they are positive and do not know. However, transforming someone's emotions into energy toward the health behavior change will only take an individual to a certain point if they do not practice for the change.

Practice for Change

Practice for change is the second construct within the sustenance component of the multi-theory model of health behavior change. Derived from Freire's adult education model's praxis component, practice for change is the act of active reflection and reflective action (Sharma, 2015). Sharma (2015) suggested that practice to change techniques include writing in a journal with the goal of recording progress toward the

desired health behavior change. A relevant example of practice for change can be built on the initiation components. As discussed, if an individual received an appointment for HIV screening, they could map out where the clinic is in relation to their job or their home. As a result, the individual will be able to plan out their route when the day comes. This could also include putting a recurring reminder on their electronic calendar for when the next screening should occur. Using the first experience, after initiation, to identify ways to overcome initial barriers is part of practicing for change as well. For example, an individual might have planned that the clinic is less than a mile from their home and on the way from work. However, they scheduled their time too close to the end of the day and felt rushed or worried because they were late to their appointment. Practicing for change would be to schedule the next screening appointment for later in the day. By being mindful of the potential obstacles and generating solutions to overcome them to achieve the desired health behavior change is practicing for change. However, practicing for change is only part of sustenance. An individual's social environment has additional impact on sustenance.

Changes in the Social Environment

Changes in the social environment is the third construct within the sustenance component of the multi-theory model of health behavior change. Derived from the construct of environment from Bandura, changes in the social environment are the act of an individual creating a social environment that is supportive (Sharma, 2015). As discussed, stigma is a deterrent to HIV screening (James & Ryan, 2018; Jones et al., 2019; Lin et al., 2017; Mukherjee et al., 2018). When an individual's social environment

contributes to being stigmatized based on HIV status or risk factors associated with HIV, they are less likely to engage in HIV screening behaviors. Changing their social environment to remove the negative aspects associated with decreased screening can increase the possibility of engaging in the desired health behavior change.

Limitations of Existing Behavioral Theories

The multi-theory model of health behavior change is a new theoretical approach to health behavior change and differs from many of the pre-existing theories within the field. Health behavior and integration of health education and health promotion is a relatively new field. The multi-theory model of health behavior change uses elements from some of the major theoretical models within health behavior, such as the health belief model, transtheoretical model, theory of planned behavior and social cognitive theory. However, it also addresses some of the concepts these models lack. As a result, theoretical frameworks, such as the multi-theory model of health behavior change, are growing and developing along with science and field. This section will review the limitations of existing behavioral theories, as it pertains to health behavior change, and how the multi-theory model of health behavior change addresses these limitations for the current study.

Health Belief Model (HBM)

The health belief model is a commonly used theory within the health education and promotion field. The health belief model is made up of six constructs, which include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Sharma, 2017). The original intent of the health belief model

was to assess the widespread failure of individuals to access programs that prevent and detect disease (Salazar et al., 2015). Previous application of the model is extensive but can be centered around some main themes, which include developing models and instruments for behavioral research, disease prevention programs using health education, and screening for secondary prevention tasks such as follow up screening and treatment compliance. However, various studies found that the health belief model has significantly less predictive power when compared to other health behavior theories (Glanz et al., 2015; Orji et al., 2012; Sharma, 2017). In addition, the health belief model assesses factors associated with disease or injury avoidance but is limited in assessment of impact on longitudinal health behavior changes (Glanz et al., 2015; Sharma, 2017). There is also a lack of clarity in the relationship between the individual components (Orji et al., 2012). These limitations are what the multi-theory model of health behavior change seeks to address.

By integrating two components within the theory Sharma (2015) provides a way to assess both the short-term intent to initiate and long-term intent to sustain a desired health behavior change. The multi-theory model of health behavior change has sought to address limitations, such as predictive power and longitudinal behavior change, in current research on physical activity (Nahar et al., 2016; Sharma & Nahar, 2018; Sharma, 2017b; Sharma et al., 2020), health eating behaviors (Brown et al., 2019; Brown et al., 2020; Dokun-Mowete, 2017; Dokun-Mowete et al., 2019; Sharma et al., 2016; Sharma, Catalano, et al., 2017;Williams, 2020), tobacco cessation (Sharma, Khubchandari, & Nahar, 2017), substance abuse (Claros et al., 2020; Sharma, 2016; Sharma, Knowlden, &

Nahar, 2017), and HPV vaccinations (Asare et al, 2020; Sharma et al., 2017). This study used the multi-theory model of health behavior change for HIV screening behaviors among college-aged people.

Transtheoretical Model (TTM)

The transtheoretical model was also used in the development of the multi-theory of health behavior change. The transtheoretical model was not originally created for health behavior change but has stages of change that can be applied to health behavior change. The transtheoretical model was developed while conducting a comparative analysis of the leading theories of psychotherapy in 1979 (Glanz et al., 2015; Sharma, 2017). The theories focused on analyzing why people change and were limited on their assessment of how people changed, earning is a classification of theory of behavior instead of theory of behavior change. It was not until the 2000's that transtheoretical model was applied to and was found effective for behavior change (Sharma, 2017). However, the transtheoretical model still has significant limitations. The first limitation is significant misclassification bias around self-reporting behaviors and parsimonious in its classification of people in a defined stage. Often people can move from stage to stage and back again within minutes or hours. In addition, the transtheoretical model has a similar limitation to the health belief model, a lack of predictive potential. Furthermore, research using the transtheoretical model has focused on the construct of stages of change, yet very little has been done analyzing the construct of processes of change. Finally, Glanz et al. (2015) finds that the transtheoretical model has not produced significant results when examining the effects of some prevention programs, such as substance abuse among

children. Glanz et al. (2015) suggests that there is little to no research on the application of transtheoretical model within different cultures. Therefore, cross-cultural application is a limitation of the model. The multi-theory model of health behavior change has been applied to studies in Africa, China, India, Iran and the United States (Sharma, 2015). The studies have shown a consistent predictive potential across continents, which address the limitations of transtheoretical model and develops a model that is culturally robust. Another current model of health behavior is the theory of planned behavior, which addresses some of the cultural limitations of the transtheoretical model but comes with other limitations.

Theory of Planned Behavior

The theory of planned behavior was one of the first to assess the relationship between behavioral intent and behavior, however this left the theory open to limitations beyond intent. The theory of planned behavior was originally developed to understand the relationship between attitudes, intentions, and behaviors (Glanz et al., 2015). However, this theory does not necessarily assess behavior change (Sharma, 2017). The theory of planned behavior also encounters limitations in the fundamental assumptions of the theory. One major assumption is that perceived behavioral control and perceived power are adequate substitutes that are representative of actual behavioral control and power. In addition, the theory assumes that elements such as environment, demographic variables, and personality-related factors are part of the components of the model and do not act independently of those components. Finally, the theory relies on an individual acting with rational thoughts and does not include the possibility of irrational thoughts

and fears, especially associated with health. These assumptions leave the theory open to criticism and limitations. As a result, the multi-theory model of health behavior change builds on concepts such as perceived control to the construct of behavior confidence in the initiation component. However, it bridges the gaps and limitations that are found with the theory of planned behavior by integrating the concept that behavioral confidence is not confined to the individual but can be influenced by external sources. This leads to social cognitive theory, which is known as a robust behavioral theory that integrates personal determinants and social structural factors.

Social Cognitive Theory

The social cognitive theory produced a component, self-efficacy, that has been widely built upon by health behavior models such as health belief model, transtheoretical model, theory of planned behavior, and the multi-theory model of health behavior change. Albert Bandura developed the social learning theory in 1963 and then renamed it the social cognitive through in 1986, but the theory remains popular in health behavior research (Sharma, 2017). However, the theory has limitations to health behavior change. The theory was not designed to change behavior, but more specifically centered around learning. This leads to an argument that social cognitive theory is more applicable to children and not adults. Finally, the theory has many constructs that are not related. The theory is not parsimonious. As a result, other researchers have assessed different sets of constructs in different combinations or focused on a single construct, self-efficacy. As a result, the social cognitive theory was not effective in addressing behavioral change. The multi-theory model of health behavior change uses the component of self-efficacy to

build on initiation constructs such as behavioral confidence. However, the multi-theory model of health behavior change provides constructs that are parsimonious and malleable to work for individuals, groups, community levels and applicable across cultures.

Application of the Multi-Theory Model of Health Behavior Change in Previous Research

The multi-theory model of health behavior change was developed by Sharma (2015) as a theoretical and conceptual framework to help address gaps and limitations with the most used health behavior models. The theory has been tested in various countries and in different target populations. The results of these students found that the model was useful in predicting and describing behaviors and attitude in certain health-related issues such as, physical activity, tobaccos cessation, HPV vaccinations and substance abuse. In this section, the application of the multi-theory model of health behavior change in previous research will be discussed, with the intent of strengthening the position for use of this model in the current research study.

Predictive Potential

As discussed previously, predictive potential is a common limitation of current health behavior models. Studies on the predictive potential of the multi-theory model of health behavior change have produced positive results. Nahar et al. (2016) conducted a cross-sectional study examining the components of the multi-theory model of health behavior change on physical activity behavior among 190 college students attending a university in the Southern United States. Sharma et al. (2016) conducted a similar study on portion size consumption among college students in the Southern United States.

Sharma et al. (2017a) conducted another similar study examining the components of the multi-theory model of health behavior change on predicting water consumption instead of sugar sweetened beverages. Finally, Sharma et al. (2020) conducted another study similar study examining the components of the multi-theory model of health behavior change on predicting intentional outdoor nature contact behavior among college students. All four of the studies found that both components, initiation, and sustenance, of the multi-theory model of health behavior change explained a statistically significant variance in health behavior change.

Expanding beyond college students, Brown et al. (2019; 2020) conducted a study examining the components of the Multi-Theory Model if Health Behavior Change on fruits and vegetables consumption behavior among African American women in Mississippi and Williams (2020) on African American men in Mississippi. All these studies also found that both components, initiation, and sustenance, of the multi-theory model of health behavior change explained a statistically significant variance in health behavior change. Expanding beyond the Southern United States, Dokun-Mowete et al. (2017; 2019) conducted a study examining the components of the multi-theory model of health behavior change on predicting low salt intake among Nigerian adults with Hypertension. Asare et al. (2020) conducted a study examining the components of the multi-theory model of health behavior change on predicting the likelihood of accepting the series of HPV vaccinations among Ghanaian adolescents. All these also found that both components, initiation, and sustenance, of the multi-theory model of health behavior change explained a statistically significant variance in health behavior change.

As a result, the multi-theory model of health behavior change has shown the predictive potential that other health behavior models lack. For the purposes of this study, application of the multi-theory model of health behavior change will be applied to college-aged people as it has already generated predictive results in this population. However, this study will expand the applicability of the model to the Western United States. In addition, this study will test the applicability of the two components, initiation, and sustenance, to HIV screening behaviors. Predictive potential of the components of the multi-theory model of health behavior change have not been previously assessed. This will also add to the framework's intent to be applicable across cultures.

Applicable Across Cultures

As discussed previously, applicability across cultures is a common limitation of current health behavior models. Studies have produced similar results in various countries when using the multi-theory model of health behavior change. The theory has been tested in Ghana among adolescents with the intent of measuring predictability of initiation and sustenance of HPV vaccinations (Asare et al., 2017), salt intake among Nigerian adults with hypertension (Dokun-Mowete et al., 2017; 2019), substance use behavior in the United States (Claros et al., 2020), and other health behaviors in the Southern United States (Brown et al., 2019; 2020; Nahar et al., 2017; Sharma et al., 2016; Sharma, Catalano, et al., 2017; Sharma et al., 2020; Williams, 2020). All of which, despite different cultural norms, attitudes, or beliefs, found that the components of the multi-theory model of health behavior change were predictive of the desired health behavior change. In addition to these there are various presentations and articles awaiting

publication that expand the multi-theory model of health behavior change to be cross-cultural. This study looks to expand the applicability across culture by examining the predictability of initiation and sustenance of HIV screening behaviors among college-aged people in the Western United States.

One-Time and Long-Term Health Behavior Change

Current theories only focus on initiation or sustenance, but rarely do they consider both elements in health behavior change. All of the studies discussed, have shown that the multi-theory model of health behavior change both initiation and sustenance can be predictive on one-time and long-term health behavior change (Asare et al., 2017; Brown et al., 2019; 2020; Claros et al., 2020; Dokun-Mowete et al., 2017; 2019; Nahar et al., 2017; Sharma et al., 2016; Sharma, Catalano, et al., 2017; Sharma et al., 2020; Williams, 2020). HIV screening behaviors is something that must be initiated and sustained to make a difference in the reduction of overall new incidence of HIV. As a result, the multi-theory model of health behavior change addresses gaps and limitations that have not been previously examined in the literature as it pertains to HIV screening behaviors among college-aged people. This study examined this gap in the literature to strengthen the validity of the multi-theory model of health behavior change and expand the body of knowledge to include future research on HIV screening behaviors from a new perspective.

Literature Review Related to Key Variables

Global Challenges, Treatment, and Control of HIV

Although advances in HIV screening and treatment have been made over the

years there are still challenges that people face to receive treatment and information to control the spread of the virus. Leading organizations in HIV global monitoring such as UNAIDS (2017), WHO (2016), Peace Crops (n.d.) and Kaiser Family Foundation (2020), all point to similar challenges in the treatment and control of HIV globally. These challenges are access to care, socioeconomic, and cultural stigmas. WHO (2016) has suggested that progress in global HIV prevention has stalled and, in some cases, is re-emerging due to these global challenges. As a result, a renewed focus on HIV prevention is key to addressing this global epidemic. Finding new ways to address the factors that are contributing to transmission of HIV among individuals in high-risk groups can help. This is accomplished by examining contributory factors that prevent or dissuade college students from initiating and sustaining HIV screening behaviors.

Contributory Factors to HIV Screening Behaviors

There are many factors associated with initiation and sustainability of HIV screening behaviors among college-aged people. Using an ecological approach to review the literature on contributory factors to HIV screening behaviors among college-aged people, there multiple levels of determinants (McLeroy et al.,1988). As a result, the contributing factors associated with HIV screening behaviors in college-aged people will be organized in three main levels: intrapersonal factors, interpersonal factors, and environmental factors (institution and community). The first is individual or intrapersonal factors. Intrapersonal factors associated with HIV screening behaviors include an individual's level of HIV knowledge (Aronowitz et al., 2018; Eastman-Mueller et al., 2019; James & Ryan, 2018; Lidong et al., 2017; Lin et al., 2017; Sabato, 2015; Wong et

al., 2019, Xu et al., 2019), an individual's perception of the level of confidentiality of services (Fernandez et al., 2019; Jones et al., 2019; Lin et al., 2019; Wu et al., 2019), and an individual's motivation to get tested (Anwuri et al. 2017; Ayodele, 2017; James et al., 2019; Kort et al., 2017; Lin et al., 2017). The second is interpersonal factors. One of the major interpersonal factors associated with HIV screening is stigma (James & Ryan, 2018; Jones et al., 2019; Lin et al., 2017; Mukherjee et al., 2018). The final factor discussed will be environmental factors. For this review, institutional and community factors are combined into environmental factors because the college or university, as the institution, can create the community that could encourage and normalize HIV screening behaviors among members of the college's community. Environmental factors associated with HIV screening is access to screening and normalization of HIV screening behaviors within the community (James and Ryan, 2018; Fernandez et al., 2018).

Intrapersonal Factors

Level of HIV Knowledge. A major individual barrier for young adults to engage in HIV screening behaviors is their level of HIV knowledge. There is a statistically significant association between HIV knowledge and the increased likelihood of an individual participating in HIV screening behaviors (Eastman-Mueller et al., 2019; James & Ryan, 2018; Wong et al., 2019). Easman-Mueller et al. (2019) conducted a study using high school and college students. Among the results presented for college students, they were significantly more likely to get tested for HIV and talk with romantic partners. James and Ryan (2018) conducted a study on college student's HIV knowledge and HIV testing history. They found that college students having had an HIV test was associated

with higher levels of knowledge (James & Ryan, 2018). Finally, Wong et al. (2019) conducted a systematic review of studies that evaluated the effectiveness of peer education in increasing sexual health knowledge and reducing sexual health risks. They found that some risk behavior, that were related to an increased chance of becoming infected with HIV, changed. This includes a reported increase in the use of condoms and HIV testing.

However, these findings are not consistent (Aronowitz et al., 2018; Lidong et al., 2017; Lin et al., 2017; Sabato, 2015; Xu et al., 2019). Xu et al. (2019) found that, within three universities in Hunan, China, HIV knowledge and use of HIV prevention services were not significantly associated. HIV prevention services in Xu et al.'s (2019) study included HIV testing services in the definition. In addition, Lidong et al. (2017) and Lin et al. (2017) found that health education and awareness alone did not contribute to increased HIV testing. There are other individual factors that must be addressed in conjunction with education, such as mitigating perceived risk. This is supported by Aronomitz et al. (2018) survey results that found 45% of college students on their campus were aware of free HIV testing, however only 2% participated. In addition, Sabato (2015) findings suggest that young adults who participate in HIV testing engaged in greater risky sexual behaviors when compared to those who did not seek HIV testing.

As a result, there are varying findings on how HIV knowledge, as an individual factor, impacts the initiation and sustainability of HIV screening behaviors among college students. This means that failure to address the factors that lead to the inconsistencies provided in the literature, will continue to lead to low adherence to HIV screening

behaviors among college students. Another individual factor, associated with low adherence to HIV screening behaviors among college students, is centered around an individual's perceived level of risk due to a perceived lack of confidentiality.

Confidentiality. Another individual barrier for college-aged people to engage in HIV screening behaviors is how they perceive the level of confidentiality. Confidentiality can be perceived at multiple levels of the HIV screening process, such as gathering information on HIV services and obtaining HIV services in a confidential manner. This is present in Fernandez et al. (2019), Jones et al. (2019), and Wu et al. (2019), where social media was a mechanism for the delivery of HIV testing materials that would be considered safe and confidential if there were no links attached. All three of these studies considered different ethnic groups in their study: Hispanic (Fernandez et al., 2019), Black (Jones et al., 2019), and Chinese (Wu et al., 2019). Lin et al. (2017) supports these findings, in their theory-based research, by suggesting that students are more open to receive confidential information related to HIV-testing through various media messaging sources. As a result, perception of confidentiality can influence a college student's perception of risk when accessing HIV screening services. If found that the services are not perceived as confidential, intent to engage HIV screening services will be impacted. However, individual barriers to HIV screening behaviors are still more complex. Aside from addressing knowledge and level of confidentiality, an individual's motivation factors into their willingness to initiate and sustain HIV screening behaviors.

Motivation. Another individual barrier for college-aged people to engage in HIV screening behaviors is motivation. Some studies review motivation in terms of perceived

benefit (Anwuri et al. 2017; Kort et al., 2017), others review motivation in terms of perceived risk (Ayodele, 2017; James et al., 2019; Kort et al., 2017; Lin et al., 2017). In perceived risks effect on motivation, some researchers found that a perception of invincibility led to decreased motivation for participation in HIV screening behaviors (Lin et al., 2017). Ayodele (2017) found that elements of the theory of planned behavior, including perceived risk of HIV infection were supportive in predicting HIV testing intention among young adults. In addition, James et al. (2019) found that college age students with higher risky sexual behavior also have increased perceived risk and increased intent to get tested for HIV. Some researchers found that the perceived risk of positive results, decreased HIV screening behaviors among college-aged people who identified themselves as men who have sex with men (Kort et al., 2017). However, Gottert et al. (2020) suggests that individuals with high HIV risk profiles still often were still less likely or no more likely to access HIV services when compared to individuals with lower HIV risk profiles. Gottert et al. (2020) did focus on Black men in Durban, South Africa which may have contributed to the conflicting views of perceived risk and motivation to participate in HIV services, such as screening.

In perceived benefits effect on motivation, Anwuri et al. (2017) found that the health belief model variable, perceived benefits, had the strongest association with increased HIV testing among college-aged people. Interestingly, Kort et al. (2017) found that risk and benefit effects different demographics. Among straight college age males their motivated to engage in HIV screening behaviors was driven by the receipt of a promotional t-shirt, while college age males that identified as gay or bisexual were

motivated by their past risky sexual behaviors of condomless sex (Kort et al., 2017).

As a result, motivation, whether it is created by perceived risk or benefit, also plays a role in HIV screening behaviors. However, there are mixed findings on what has a greater impact on intent and sustainability of HIV screening behaviors among college-aged people. Although individual factors contribute to HIV screening behaviors, interpersonal factors are also contributing factors to HIV screening behaviors among college-aged people.

Interpersonal Factors

Stigma. A major interpersonal barrier for young adults to engage in HIV screening behaviors is the negative stigma that they learn from their culture, family, or social circles. In some areas of the country the stigma toward HIV/AIDS or homosexuality was one of the biggest barriers to HIV testing (James & Ryan, 2018; Mukherjee et al., 2018). In addition, the barrier stigma produces spans across two high risk populations for HIV: Hispanics and Blacks (James & Ryan, 2018; Jones et al., 2019; Mukherjee et al., 2018). Moreover, Lin et al. (2017) looked more at the barriers to HIV screening and asked what would likely increase their screening behaviors. They found that social and emotional support from individuals within social circles could help to overcome the perceived stigma of HIV testing. This aligns with the previous literature that stigmas as part of interpersonal relationships have a significant impact on HIV screening behaviors.

Institutional/Community Factors

Access to HIV Services on College/University Campuses. Environmental barriers for young adults to engage in HIV screening behaviors is institutional such as the ability to access care and community-based normalization of testing. Coor et al. (2018) suggests that very little has been studied on the degree to which colleges provide sexual health services and changes in services over time. Based on data from two years, provided by 2001 and 2014 responses to a national assessment of sexual health services at US colleges, there were significant perceived changes to sexual health services that are contradictory. For example, although colleges provided testing coverage as part of their college student health insurance, there was a significant decline in the number of campuses offering the student health insurance. In addition, although services expanded, there was no change in treatment and diagnosis (Coor et al., 2018). In searching for recent studies conducted on the impact of HIV services provided on college campuses and the rate of new HIV screening behaviors among college students in the community, very little was found. Expanding the literature search beyond 5 years to 10 years, provided more studies that were not considered recent. Warren-Jeanpiere et al. (2011) found that there was a difference in the perception of formal policy and no policy among Health Administrators for HIV prevention and testing within Historically Black Colleges and Universities depending on the school's funding (public or private). Dennison et al. (2014) suggested that a gap in their research was additional studies focused on understanding the setting in which college students are likely to seek HIV testing. Warren-Jeanpiere et al. (2011) discussed potential barriers to HIV screening use by

students, from the perception of health administrators at HBCUs, however did not provide statistically significant perceptions of students. In addition, Caldeira et al. (2013) suggests that there is some evidence that points toward an association between HIV testing rates and access to testing on a college campus. Fernandez et al. (2018) was among the few recent studies conducted to assess college student's perceptions of HIV testing and prevention. Fernandez et al. (2018) focused on Hispanic young adults and found that accessibility to HIV testing and prevention services was important to their community. However, they also found that normalization of these services was necessary to increase initiation and sustainability.

Normalization of HIV Services on the College/University Campus. Colleges and Universities have an opportunity to create a community culture that can normalize sexual health behaviors such as HIV screening. James and Ryan (2018) and Fernandez et al. (2018) suggest that in normalizing HIV testing and services among college students may help increase HIV screening behaviors, because normalization helps to reduce stigma and breakdown common barriers to accessing HIV testing on college campuses. Both findings were focused on surveys of perception among college students. As a result, there is an area to expand the knowledge on the relationship between normalization and rates of HIV screening behaviors.

Summary and Conclusions

This review of the literature took a comprehensive approach to build our reasoning for the necessary, relevant, and important nature of this dissertation. The review examined articles about the status of HIV and issues associated with risk

reduction behaviors, such as HIV screening. Then the review examined the limitations in the current theoretical frameworks associated with health behavior change. Finally, the review made an argument for how the multi-theory model of health behavior change is an applicable and novel approach to HIV screening behaviors among college-aged people.

Upon examining the literature for the status of HIV, globally, there is current data that shows a plateau and potential increase in new incidence of HIV. As a result, developing effective interventions to decrease the new incidence of HIV is increasingly important. One tool to decrease the new incidence of HIV is through HIV screening behaviors. However, targeting the population that would benefit most from this intervention helps to provide effective interventions to high-risk groups. The literature suggests that young adults that are college-aged or in college are the most at risk for new incidence of HIV and would benefit most from greater HIV screening behaviors. However, the various approaches presented in the literature suggest different results. Some literature states that HIV education produces significant results toward greater HIV screening behaviors, while others disagree. Some posit that HIV education is only a single element within a complex structure that inhibits or encourages college-aged people to access HIV screening resources. In addition, much of the research looked at intent or initiation of the desired behavior or sustenance of the desired behavior. However, none focused on all of these elements. All of this information lends itself to the argument that a new approach to HIV screening behaviors among college-aged people is relevant and important.

The new approach to HIV screening behaviors among college-aged people being

proposed in this dissertation is the multi-theory model of health behavior change. This literature review focused on how the multi-theory model of health behavior change addressed multiple limitations found in the current theoretical frameworks. Most of the current theories lack predictive potential. The multi-theory model of health behavior change has been tested and shows strong predictive potential. In addition, some of the theories lack a parsimonious approach, which causes difficulty in assessing the theory in its entirety and lends itself to an inability to adapt to different cultures. The multi-theory model of health behavior change has been tested and shows an ability to be applicable within multiple cultures and parsimonious. Finally, the components, initiation, and sustenance, of multi-theory model of health behavior change build upon the limitations of all current health behavior theories, in that it can assess short-term and long-term behaviors. As a result, the elements discussed in this literature review suggest that the multi-theory model of health behavior change is relevant and applicable, as a novel approach of this dissertation, to examine the predictability of the component of initiation and sustenance on HIV screening behaviors among college-aged people. In the next chapter, details of the methods with rationale, the study design, sampling strategy, and instruments will be provided to explain how this dissertation will achieve that goal.

Chapter 3: Research Method

The purpose of this quantitative, cross-sectional study was to examine how the constructs of the multi-theory model of health behavior change, emotional transformation, practice for change, and changes in the social environment (independent variables) explain the behavior change of college-aged people in initiating and sustaining HIV screening behavior (dependent variable) as a lifestyle modification, while controlling for age, gender, work status and race. A multivariate linear regression analysis was used to assess the correlation between the constructs of multi-theory model for behavior change (independent variables) and the decision of college-aged people to initiate and sustain HIV screening (dependent variable) as a health behavior change.

In this chapter, research methodology that was adopted to ensure a scientific investigation for this dissertation will be discussed. Details of research methodology include research design and rationale, sampling strategy, data collection process, instrumentation, discussion on internal and external threats to validity, and data processing and analysis. The intent of this chapter is to provide a systematic approach to answering the research questions on the initiation and sustenance of HIV screening behaviors to control and prevent new incidence of HIV among college-aged people.

Research Design and Rationale

This study addressed the research problem and research question through a quantitative research method using a cross-sectional survey design. Cross-sectional studies are useful for public health planning, monitoring, and evaluation (Setia, 2016a). In addition, cross-sectional designs can be used to support future cohort studies. The goal

of this dissertation is to provide information on the utility of the components of the multi-theory model of health behavior change, which can inform future cohort studies or interventions geared toward addressing new incidences of HIV. A cross-sectional survey design is advantageous to this study given the capacity to survey a larger population while reducing costs and increasing ability to complete the study within a reasonable dissertation timeline (Creswell, 2018; Setia, 2016a). The survey included close-ended questions that could be converted into numerical data to evaluate the utility of the constructs of multi-theory model of health behavior change on HIV screening behaviors among college-aged people.

Methodology

Sampling Strategy

I recruited a sample of the population that is a nonprobability sample or convenience sample. This type of sampling is often used, although less desirable due to the limitations for generalizability beyond the population sampled (Creswell & Creswell, 2018). However, non-probability sampling is commonly used in these types of studies and when examining the impact on a certain group and not the general population (Setia, 2016b). As a result, non-probability sampling methods such as convenience sampling are effective for meeting the needs of the study, within an acceptable timeframe. The study participants are college-aged people in the San Joaquin Valley of California. I recruited participants using zip codes from eight counties located in the Joaquin Valley of California.

Sample Size and Target Population

A minimum sample size of (N = 103) of consenting respondents was derived through G* power analysis. The sample size was calculated using F tests in the test family for a multiple linear regression (Fixed model, R^2 deviation from zero) statistical test. In addition, this was an a priori power analysis, which is used to compute the required sample size given a target alpha, power, and effect size. For this study, the sample size needed was based on a medium effect size (0.15), standard power (0.80), and the number of predictors (seven). The number of predictors was calculated based on the independent variables for this study, which are the three constructs for each of the initiation and sustenance components of the multi-theory model of health behavior change and four covariates (age, gender, work status, and educational background).

The target population was recruited by Qualtrics using county zip codes for the San Joaquin Valley of California. These counties consist of Kern County, Tulare County, Kings County, Fresno County, Madera County, Merced County, San Joaquin County and Stanislaus County. The study will recruit participants 18–34.

Data Collection

The data collection process consisted of an online survey through Qualtrics that collected data on the variables for each research question. No identifying names and contact information of the participants were solicited. Qualtrics provided incentives to participants. Participation in the survey was completely voluntary, and the participants could leave the survey at any point in time. Prior to collecting data, the questionnaire was evaluated.

Instrumentation

Measuring Change in HIV Screening Behavior Among College-aged people is a 44-item face and valid content questionnaire (Appendix A), developed and copyrighted by Sharma (2018). For the purposes of this study, a letter of permission was obtained to use the copyrighted instrument (Appendix B). Previous research studies related to various health-related behaviors measured and validated support the constructs multi-theory model of health behavior change as a reliable instrument (Nahar et al.; 2016; Knowlden et al., 2016; Sharma, 2016). Kanekar et al. (2018) further established internal consistency and construct validity of the Measuring Change in HIV Screening Behavior Among College Students instruments.

The first three questions of the Measuring Change in HIV Screening Behavior Among College Students questionnaire helped met establish if the participants met the inclusion criteria of having a sexual partner in the past 6 months, being in a monogamous relationship, and not currently being diagnosed with HIV. The next nine questions of the questionnaire gathered socioeconomic, demographic, and educational background data. The remaining questions collected data pertaining to the constructs of the multi-theory model of health behavior change components, initiation, and sustenance.

Instrument Validity. Validity is another important quality metric for a new instrument being tested. An instrument has reasonable validity if it measures the constructs or theoretical variables that it was intended to measure (Warner, 2013). The instrument already has face and content validity established by a panel of experts. For the purposes of this study, construct validity was established using confirmatory factor

analysis utilizing maximum likelihood method. Eigen value greater than 1 and factor loadings greater than 0.42 was used to confirm each subscale (see Sharma & Petosa, 2014).

Data Analysis

Results were analyzed using SPSS to generate descriptive statistics of the study variables and to determine the association between the study variables through multiple linear regression analysis. More specifically, the association between the constructs of the multi-theory model of health behavior change and HIV screening behaviors among college-aged people was examined for potential statistical significance. The raw data collected from participants were translated into numerical values with the intention of creating a dataset that is compatible with SPSS software and the statistical tests. A multiple linear regression analysis was used to assess the correlation between the constructs of multi-theory model for behavior change (independent variables) and the decision of college-aged people to initiate and sustain HIV screening (dependent variable) as a health behavior change. The minimum sample size ($N = 103$) was determined using G* Power based on a medium effect size (0.15), standard power (0.80), and the number of predictors (seven). The calculation resulted in recruitment of 103 consenting participants who met the inclusion criteria to ensure the study meets quality metrics.

Initiation Model

The first research question of this study asks are the constructs of multi-theory model of health behavior change (independent variables) associated with the decision of

college-aged people to initiate HIV screening (dependent variable)? As a result, one question is used to assess the initiation component (dependent variable) of the multi-theory model of health behavior change "How likely is it that you will get HIV testing in the upcoming week?". Response options ranged from Not at all likely (0) to completely likely (4). In addition, the Measuring Change in HIV Screening Behavior Among College Students questionnaire will assess the constructs (independent variables) of the initiation component.

Participatory Dialogue

The participatory dialogue construct is one of the independent variables that will be used to address research question one. The Measuring Change in HIV Screening Behavior Among College Students questionnaire employs ten survey items to evaluate advantages (5 survey items) and disadvantages (5 survey items) of HIV testing. The 10 survey items are a Likert Scale ranging from Never (0) to Very Often (4). For both advantages and disadvantages, the scores will be added for each section, 0-20 for advantages and 0-20 for disadvantages. To obtain a score for the participatory dialogue construct, the score for disadvantages was subtracted from the score for advantages. Sharma (2015) provides that a higher score in this component is associated with a greater possibility of initiating a positive behavior change. For the purposes of this study, the higher the score of the participatory dialogue component will increase the likelihood of initiating HIV testing.

Behavioral Confidence

The behavioral confidence construct is another independent variable that will be

used to address research question one. The Measuring Change in HIV Screening Behavior Among College Students questionnaire employs five survey items. The five survey items are a Likert Scale ranging from Not At All Sure (0) to Completely Sure (4). The scores will be added for this component, with an end score between 0 and 20. The higher the score in this component is also associated with a greater possibility of initiating a positive behavior change. For the purposes of this study, the higher the score of the behavioral confidence component will increase the likelihood of initiating HIV testing.

Changes in the Physical Environment

The changes in the physical environment construct is another independent variable that will be used to address research question one. The Measuring Change in HIV Screening Behavior Among College Students questionnaire employs three survey items. The three survey items are a Likert Scale ranging from Not At All Sure (0) to Completely Sure (4). The scores will be added for this component, with an end score between 0 and 12.

Sustenance Model

The second research question of this study asks are the constructs of multi-theory model for health behavior change (independent variables) associated with the decision of college-aged people to sustain HIV screening (dependent variable)? As a result, one question is used to assess the sustenance component (dependent variable) of the multi-theory model of health behavior change "How likely is it that you will get HIV testing every year from now on?". Response options ranged from Not at all likely (0) to

completely likely (4). In addition, the Measuring Change in HIV Screening Behavior Among College Students questionnaire will assess the constructs (independent variables) of the sustenance component.

Emotional Transformation

The emotional transformation construct is another independent variable that will be used to address research question two. The Measuring Change in HIV Screening Behavior Among College Students questionnaire employs three survey items. The three survey items are a Likert Scale ranging from Not At All Sure (0) to Completely Sure (4). The scores will be added for this component, with an end score between 0 and 12. The higher the score in this component is also associated with a greater possibility of sustaining the positive behavior change.

Practice for Change

The practice for change construct is another independent variable that will be used to address research question two. The Measuring Change in HIV Screening Behavior Among College Students questionnaire employs three survey items. The three survey items are a Likert Scale ranging from Not At All Sure (0) to Completely Sure (4). The scores will be added for this component, with an end score between 0 and 12. The higher the score in this component is also associated with a greater possibility of sustaining the positive behavior change.

Changes in the Social Environment

The changes in social environment construct is another independent variable that will be used to address research question two. The Measuring Change in HIV Screening

Behavior Among College Students questionnaire employs three survey items. The three survey items are a Likert Scale ranging from Not At All Sure (0) to Completely Sure (4). The scores will be added for this component, with an end score between 0 and 12. The higher the score in this component is also associated with a greater possibility of sustaining the positive behavior change.

Threats to Validity

Research Design

Internal validity differs based on research design. Internal validity is defined as "the extent to which the observed results represent the truth in the population we are studying and, thus, are not due to methodological errors" (Patino & Ferreira, 2018, p. 183). As a result, randomized-control trails have high internal validity, whereas cross-sectional study designs have low internal validity (Carlson & Morrison, 2009). Cross-sectional study designs have low internal validity because it does not cover certain confounders such as a temporal relationship between exposure and outcome. Cross-sectional studies can measure association but cannot assume a causal relationship between exposure and outcome.

Poor Sample Size

Poor sample size is a common threat to the validity of studies that use questionnaires. As a result, it is important to demonstrate how the researcher determined the sample size to avoid this threat to validity. The greater the sample size, the greater the statistical power ("Consideration of Sample Size in Neuroscience Studies," 2020). In addition, positive predictive values are associated with the level of power. As a result,

lower power leads to lower positive predictive values. For the purposes of this study, sample size was determined using G* Power based on a medium effect size (0.15), standard power (0.80), and the number of predictors (7). The calculation resulted in recruitment of 103 consenting participants that meet the inclusion criteria to ensure the study meets quality metrics.

Instruments

Threats to validity and reliability must be addressed when using a new instrument. The instrument used for this research has been validated for face and content validity by a panel of experts. Adaptations of these questionnaires have been used in previous studies (Knowlden et al., 2016; Nahar et al., 2016; Sharma, 2016) to examine risky health behaviors such as large food portion sizes and obesity, improvement in the daily sleeping order, and reduction of binge drinking and physical inactivity. In contrast, this study examined the adequacy of the multi-theory model of health behavior change instrument by collecting information from consenting participants to determine the psychosocial and environmental factors influencing the initiation and sustenance of HIV screening behaviors among college-aged people using the constructs of multi-theory model. In addition, this study will establish construct validity for the instrument by confirmatory factor analysis using maximum likelihood method on the sample that is recruited for the study.

Poor Response to Instruments (Questionnaire)

With the rise of online questionnaires and online data collection, comes threats to validity of the data collected. Soland, Wise, and Gao (2019) identified invalid survey

data as data that arises when respondents misunderstand a question, misrepresent what they know to be true, or do not engage with the item. In addition, Al-Salom and Miller (2017) agree that there are many factors that play a role in the validity of data collected online, which includes a lack of engagement in a survey item. This is often reflected as short-response times within a survey but no scientific cutoff can reveal what defines "engagement" (Soland et al., 2019; Al-Salom & Miller, 2017). As a result, a separate sample of 30 participants 2 days prior to a second administration of the test will be conducted to calculate correlation coefficients on all subscales for test-retest reliability and to check that the instrument elicited valid responses to questions in the questionnaire.

Ethical Considerations

Human subjects research protections are governed by 45 CFR 46, which is federal regulations filed by the Department of Health and Human Services (Department of Health and Human Services, 2018a). An application for this study was submitted to the Institutional Review Board (IRB) for exemption status under 45 CFR 46 section 104(d)(2) Exempt research which allows a study to be exempt from Full Board Review because it is research that only includes interactions involving survey procedures and the information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subject. IRBs and Human Subjects Research Protection Programs (HRPPs) are also governed by ethical regulations and policies as outlined by the Belmont Report, which includes respect for persons, beneficence and justice and the following information will be presented to the IRB for further consideration of human subjects' research protection

(Department of Health and Human Services, 2018b). Respect for persons is the recognition that individual participants are autonomous agents (Department of Health and Human Services, 2018b). As a result, the methodology and study design of this study were designed to respect and protect an individual's status as an autonomous agent by sending out a voluntary questionnaire. This questionnaire will not be tied to any course work or grades that would negatively impact the participant. In addition, responses will not include names or identifiable information that could readily ascertain the identity of the participant. Beneficence focuses on two rules: do no harm and maximize possible benefits and minimize possible harms (Department of Health and Human Services, 2018b). This study will be anonymous and not include identifiers, which mitigates any potential for harm. The purpose of this study is to create a baseline for future research to increase HIV screening behaviors and ultimately produce a benefit to an at-risk group. Justice is about equitable access and distribution of burden (Department of Health and Human Services, 2018b). This study collected a convenience sample of voluntary participants. Finally, the participants will provide their informed consent before participating in the study.

Summary

In this chapter the methodology and materials were defined as it pertains to the execution of this study. First, the research purpose statement was discussed to support the proposed research design and methodology. As a result, to evaluate the constructs of the multi-theory model of health behavior change (purpose), this study proposed using a quantitative approach by way of a cross-sectional survey design. To strengthen the study

design, the proposed components of the research methodology included sampling strategy, data collection process and the validation of the instrument. In addition, this chapter discussed how ethical concerns would be addressed by mitigating the areas provided by the Department of Health and Human Services in the Federal Regulation 45 CFR 46 and international regulations such as the Belmont Report. Finally, study actions that mitigate threats to validity were discussed to address issues and strengthen the study results. The structure proposed in this article will provide support for the documentation of analyzed results and inferences (Chapter 4) to support conclusions and recommendations (Chapter 5).

Chapter 4: Results

This quantitative, cross-sectional study was designed to examine if the components of the multi-theory model of health behavior change can explain the initiation and sustenance of HIV screening behavior among college-aged people. As a result, two research questions were studied:

- Are the constructs of multi-theory model of health behavior change—participatory dialogue, behavioral confidence, changes in the physical environment (independent variables)—associated with the decision of college-aged people to initiate HIV screening (dependent variable) while controlling for demographical factors like age, gender, educational background, and work status?
- Are the constructs of multi-theory model of health behavior change—emotional transformation, practice for change, and changes in the social environment (independent variables)—associated with the decision of college-aged people to sustain HIV screening (dependent variable) while controlling for demographical factors like age, gender, educational background, and work status?

After a comprehensive data collection process and procedure, results from 151 participants are presented in tables, figures, and discussions.

Data Collection Process

A sample size of 103 consenting participants was derived through G* power analysis. The minimum sample size needed ($N = 103$) was based on a medium effect size

(0.15), standard power (0.80), and the number of predictors (seven). The data collection process consisted of an online survey through Qualtrics to collect data on the variables for each research question. The first three questions of the Measuring Change in HIV Screening Behavior Among College Students questionnaire helped establish if the participants met the inclusion criteria of having a sexual partner in the past 6 months, being in a monogamous relationship, and not currently being diagnosed with HIV. The next nine questions gathered socioeconomic, demographic, and educational background data. The remaining questions collected data pertaining to the constructs of the multi-theory model of health behavior change components, initiation, and sustenance.

Forms were submitted for approval by the Walden Institutional Review Board (IRB). The Walden University IRB granted approval to commence data collection on October 21, 2021, with the approval number 10-08-21-0750474. An extension was submitted and approved on January 4, 2023. A request for change in proposal was submitted and approved on February 27, 2023. The Walden IRB approval covered the stated specification of the consent form and methods, processes, and procedures for obtaining data for this study.

Results

Statistical Analysis

SPSS version 27 was used to carry out the statistical analyses of all the data obtained. The generated data included the descriptive statistics of variables and that of participants, as well as the multiple regression analysis that focused on the two research questions of the study.

Characteristics of the Study Participants

The demographic and socioeconomic characteristics of sample population are displayed in Table 1 with the group frequencies of the gender, race/ethnicity, ages, educational background, work status, LGBTQ identify, location and insurance status. In total, 151 college-aged people were sampled. Table 1 shows the breakdown of these study participants.

Table 1

Demographic and Socioeconomic factors of Participants

	%	*N*
Gender		
Male	57.6	63
Female	41.7	87
Race/Ethnicity		
American Indian/Alaska Native	0.7	1
Asian American	9.3	14
Black or African American	11.3	17
Hispanic American	43.7	66
Other	1.3	2
White or Caucasian American	33.8	51
Age Groups		
18-24	52.3	79
25-29	18.6	28
30-34	29.1	44
Educational Background		
Not currently enrolled	33.8	51
Freshmen	10.6	16
Sophomore	9.9	15
Junior	3.3	5
Senior	7.9	12
Graduate	34.4	52
Work Status		
No Work	43	65
Working	57	86
LGBTQ		
Do not Identify as LGBTQ	78.1	118
Identify as LGBTQ	21.9	33
Location		

Rural Area	23.2	35
Semi-urban	35.1	53
Urban Area	41.7	63
Insurance		
No insurance	7.9	12
Private	22.5	34
Public health insurance	69.5	105

Characteristics of the Study Variables

Table 2 shows the descriptive statistics of variables for this study. The construct of initiation contains participatory dialogue, behavioral confidence, and changes in environment to assess the likelihood of initiating HIV testing within the next week. For participatory dialogue, a high score is associated with the likelihood of initiating a behavioral change to get a HIV test. With a combined advantage and disadvantage mean score of 2.70 (SD: 5.85) out of a possible range of -20 - +20 demonstrates a low likelihood among participants. For behavioral change, a high score is associated with the likelihood of initiating a behavioral change to get a HIV test. Table 2 shows that the mean of 8.30 (SD: 5.54) out of a possible range of 0-20 demonstrates a low likelihood among participants. For change in physical environment, a high score is associated with the likelihood of initiating a behavioral change to get a HIV test. Table 2 shows that a mean of 5.93 (SD: 3.42) out of a possible range of 0-12 demonstrates a moderate likelihood among participants. Overall, the mean score of 1.67 (SD: 1.46) for initiating HIV testing within the next week demonstrates that participants were moderately sure that they would initiate the health behavior change.

The construct of sustenance contains emotional transformation, practice for change, and changes in social environment to assess the likelihood of sustaining HIV

testing every year from now on. For emotional transformation, a high score is associated with the likelihood of sustaining a behavioral change to get a HIV test. Table 2 shows that the mean of 1.89 (SD: 1.30) out of a possible range of 0-4 demonstrates a moderate likelihood among participants. For practice for change, a high score is associated with the likelihood of sustaining a behavioral change to get a HIV test. Table 2 shows that the mean of 6.29 (SD: 3.47) out of a possible range of 0-12 demonstrates a moderate likelihood among participants. For changes in social environment, a high score is associated with the likelihood of sustaining a behavioral change to get a HIV test. Table 2 shows that the mean of 6.80 (SD: 3.49) out of a possible range of 0-12 demonstrates a moderate likelihood among participants. Overall, the mean score of 1.89 (SD: 1.30) for sustaining HIV testing every year from now on demonstrates that participants had were moderately sure that they would sustain the health behavior change.

Table 2

Descriptive Statistics of Variables for Study (N = 151)

Constructs	Possible Ranges	Observed Ranges	Mean (SD)
Initiation	0-4	0-4	1.67(1.46)
Participatory Dialogue: Advantages	0-20	0-20	12.12(5.01)
Participatory Dialogue: Disadvantages	0-20	0-20	9.42(5.02)
Participatory Dialogue: Adv.-Disadv.	20-(+20)	-16-(+18)	2.70(5.85)
Behavioral Confidence	0-20	0-20	8.30(5.54)
Changes in the Physical Environment	0-12	0-12	5.93(3.42)
Sustenance	0-4	0-4	1.89(1.30)
Emotional Transformation	0-12	0-12	6.29(3.47)
Practice for Change	0-12	0-12	5.89(3.43)
Changes in the Social Environment	0-12	0- 12	6.80(3.49)

Face and Content Validity of MTM Instrument

This study relied on the face and content validity analysis of the multi-theory model of health behavior change instrument conducted by Dr. Sharma. In a two-round process, Dr. Sharma engaged a professional panel (*n*=6) of health behavior researchers to determine the face and content validity of the multi-theory model of health behavior change structure questionnaire. The multi-theory model of health behavior change instrument was developed using clear and appropriate language with a Flesch reading ease of 66.0 and Flesch-Kincaid Grade Level of 6.7 grade (Sharma, Batra & Flatt, 2021). The experts confirmed the readability, relevance, and clarity of the items, with the unanimous vote of confidence on the adequacy of the face and content validity of the multi-theory model of health behavior change subscales.

Construct Validity of MTM Instrument

Confirmatory factor analysis (CFA) using the extraction method of maximum likelihood was utilized. A CFA was performed on seven constructs of the multi-theory model of health behavior change to establish construct validity of the subscales: advantages, disadvantages, behavior confidence, changes in the physical environment, emotional transformation, practice for change, and changes in the social environment. The CFA revealed that all constructs met Eigenvalue-one criteria and explained 47.5%, 51.9%, 59.6%, 67.4%, 68.9%, 67.6%, and 67.3% of the total variance, respectively. All subscales had a one-factor solution and all factor loadings were more than twice the critical value of 0.217 (Stevens, 1996). The minimum factor loading was 0.434.

Multivariate Analyses of the Research Questions and Hypotheses

The purpose of this study was to assess the impact of the constructs of the multi-theory model of health behavior change (independent variables) on behavior, such as HIV screening behaviors of college-aged people, while controlling for demographical factors like age, gender, educational background, and work status in the areas of investigation. A multivariate analysis was used to assess the correlation between the constructs of multi theory model for behavior change (independent variables) and the decision of college-aged people to initiate and sustain HIV screening (dependent variable) as a health behavior change.

Research Question 1

Are the constructs of multi-theory model of health behavior change; participatory dialogue, behavioral confidence, changes in the physical environment (independent variables) associated with the decision of college-aged people to initiate HIV screening (dependent variable) while controlling for demographical factors like age, gender, educational background, and work status?

Table 3 shows the results of the hierarchical multiple regression analysis of initiation model, which confirms that two out of the three multi-theory model of health behavior change initiation constructs were significant. With participatory dialogue (β =-0.019, p=0.294) at a reported p-value of higher than the significance value of 0.05, while behavioral confidence (β = 0.078, p=0.003), and changes in physical environment (β=0.137, p<0.001) reported p-values lower than the significance value of 0.05. When controlling for age, gender, educational background, and work status, none of the control

variables were statistically significant.

Table 3

Hierarchical Multiple Regression Analysis Predicting Behavior Change of Initiating HIV Testing Within the Next Week While Controlling for Gender, Work Status, Educational Background, and Age (n = 151)

	Variables	B	SE	β	t	p-value	LL	UL
1	(Constant)	1.838	.653		2.816	.006	.548	3.129
	Male (or not)	-.036	.255	-.012	-.142	.887	-.540	.468
	Work (or not)	.141	.255	.048	.551	.582	-.363	.644
	Enrolled (or not)	.019	.074	.022	.257	.798	-.127	.165
	How old are you today?	-.013	.025	-.043	-.497	.620	-.063	.038
2	(Constant)	1.242	.554		2.240	.027	.146	2.338
	Male (or not)	-.090	.215	-.030	-.417	.677	-.514	.335
	Work (or not)	.062	.215	.021	.289	.773	-.363	.488
	Enrolled (or not)	.041	.064	.048	.647	.519	-.085	.168
	How old are you today?	-.046	.022	-.156	-2.100	.037	-.089	-.003
	Participatory Dialogue	-.019	.018	-.074	-1.053	.294	-.053	.016
	Behavioral Confidence	.078	.025	.294	3.063	.003	.028	.128
	Changes Physical Environment	.137	.041	.321	3.379	<.001	.057	.218

Note. F (7, 143) = 9.173, P < 0.001, r2 (Adjusted r2) = 0.310 (0.276). Dependent variable is the behavior change; initiating HIV testing within the next week; B = unstandardized coefficient; SEB= standard error of the coefficient; β = standardized coefficient; p = level of significance

The results show that the control variables explain an inconsequential variance in the behavioral change to initiate HIV testing in the upcoming week and are not statistically significant (R^2adjusted = -0.024, F (4, 146) = 0.135, p = 0.969). The results show that a combination of the two initiation constructs predicted 27.6% of the variance in the behavioral change to initiate (R^2adjusted = 0. 276, F (7, 143) = 9.173, p < 0.001)

HIV testing in the upcoming week. With a p-value lower than the significance value of 0.05, the results justified the acceptance of the alternative hypothesis : H_a1 – The constructs of multi-theory model of health behavior change; participatory dialogue, behavioral confidence, changes in the physical environment (independent variables) are associated with the decision to initiate HIV screening (dependent variable) by college-aged people when controlling for demographical factors like age, gender, educational background, and work status.

Research Question 2

Are the constructs of multi-theory model of health behavior change; emotional transformation, practice for change and changes in the social environment (independent variables) associated with the decision of college-aged people to sustain HIV screening (dependent variable) while controlling for demographical factors like age, gender, educational background, and work status?

Table 4 shows the results of the hierarchical multiple regression analysis of initiation model, which confirms that two out of the three multi-theory model of health behavior change sustenance constructs were significant. With emotional transformation (β =0.042, p=0.298) at a reported p-value of higher than the significance value of 0.05, while practice for change (β = 0.124, p=0.004), and changes in the social environment (β=0.104, p<0.001) reported p-values lower than the significance value of 0.05. When controlling for age, gender, educational background, and work status, none of the control variables were statistically significant.

Table 4

Hierarchical Multiple Regression Analysis Predicting Sustaining HIV Testing Every Year while Controlling for Gender, Work Status, Educational Background, and Age (n=151)

	Variables	B	SE	β	t	p-value	LL	UL
1	(Constant)	1.774	.578		3.071	.003	.632	2.916
	Male (or not)	-.246	.226	-.093	-1.090	.277	-.692	.200
	Work (or not)	.298	.226	.114	1.322	.188	-.148	.745
	Enrolled (or not)	.009	.065	.012	.141	.888	-.120	.139
	How old are you today?	.000	.022	.001	.008	.994	-.044	.045
2	(Constant)	.536	.484		1.108	.270	-.420	1.492
	Male (or not)	-.317	.181	-.120	-1.753	.082	-.674	.040
	Work (or not)	.335	.180	.128	1.856	.066	-.022	.691
	Enrolled (or not)	-.041	.053	-.053	-.778	.438	-.145	.063
	How old are you today?	-.009	.018	-.035	-.499	.618	-.045	.027
	Emotional Transformation	.042	.041	.113	1.045	.298	-.038	.123
	Practice For Change	.124	.042	.327	2.929	.004	.040	.208
	Changes in the Social Environment	.104	.030	.278	3.440	<.001	.044	.164

Note. F (7, 143 = 13.130, P < 0.001, R^2 (Adjusted R^2) = 0.391 (0.361). Dependent variable is the behavior change; sustaining HIV testing every year from now on; B = unstandardized coefficient; SEB= standard error of the coefficient; β = standardized coefficient; P = level of significance

The results show that the control variables explain an inconsequential variance in the behavioral change to sustain HIV testing every year from now on and are not statistically significant p = 0.667). The results show that a combination of the three initiation constructs predicted 36.1% of the variance in the behavioral change to sustain (R^2adjusted = 0.361, F (7, 143) = 13.130, p < 0.001) HIV testing every year from now on. With a p-value lower than the significance value of 0.05, the results justified the acceptance of the alternative hypothesis : The constructs of multi-theory model of health behavior change; emotional transformation, practice for change and changes in the social

environment (independent variables) are associated with the decision to sustain HIV screening (dependent variable) by college-aged people when controlling for demographical factors like age, gender, educational background, and work status.

Summary

This chapter reviewed the data gathering methods of the study and presented the findings to the research questions that addressed the purpose and focus of this study. This study examined how the constructs of the multi-theory model of health behavior change (independent variables) predict the behavior change of college-aged people in initiating HIV screening behavior (dependent variable) as a lifestyle modification. This study also examined how the constructs of the multi-theory model of health behavior change (independent variables) predict the behavior change of college-aged people in sustaining HIV screening behavior (dependent variable). Data was gathered from 151 college-aged people through a self -administered multi-theory model of health behavior change structured questionnaire via Qualtrics. SPSS version 27 was used to conduct a multivariate regression analysis to measure the extent of the association between each of the multi-theory model of health behavior change constructs (independent variables) and the participants' decisions to initiate and/or sustain HIV testing (the dependent variables).

The outcome showed that there was a statistically significant association between the constructs of multi theory model for behavior change (independent variables) and the decision of college-aged people to initiate and sustain HIV screening (dependent variable) as a health behavior change. This can lead to further research and interventions that results in positive social change. A more detailed report on the interpretation of

findings and recommendations of the study is presented in Chapter 5.

Chapter 5: Discussion, Conclusions, and Recommendations

This study assessed the impact of the constructs of the multi-theory model of health behavior change (independent variables) on behavior, such as HIV screening behaviors of college-aged people, while controlling for demographical factors like age, gender, educational background, and work status in the areas of investigation. A multivariate analysis was used to assess the correlation between the constructs of multi theory model for behavior change (independent variables) and the decision of college-aged people to initiate and sustain HIV screening (dependent variable) as a health behavior change. This chapter includes the findings, conclusions, recommendations, and proposed areas for further studies. Furthermore, this chapter will discuss study limitations and the implications for social change.

Interpretation of the Findings

In this study, I assessed the type and extent of relationships that existed between multi-theory model of health behavior change variables (constructs and its multi-components) and a sample of college-aged people in the San Joaquin Valley. The outcomes were expressed using correlation coefficients of the multi-components with their respective constructs. The two multi-components models consist of initiation of behavior change and sustenance of behavior.

Hypothesis 1

I set out to find if the constructs of multi-theory model of health behavior change—participatory dialogue, behavioral confidence, changes in the physical environment (independent variables)—are associated with the decision to initiate HIV screening

(dependent variable) by college-aged people when controlling for demographical factors like age, gender, educational background, and work status. The results show a significant relationship accounted for 27.6% of the variance in the intention for initiation. This implied that the decision to initiate HIV testing within the next week was highly predicted and influenced by these constructs. It is noteworthy that when assessed together the three constructs have a statistically significant impact on the variance, but when looked at individually participatory dialogue (β =-0.019, p = 0.294) was reported at a p-value higher than the significance value of 0.05, and behavioral confidence (β = 0.078, p = 0.003) and changes in the physical environment (β = 0.137, $p < 0.001$) were reported at p-values lower than the significance value of 0.05. As a result, participatory dialogue was not a significant contributing factor to the initiation of HIV screening within the next week but behavioral confidence and changes to physical environment were significant contributors.

These findings support previous research that shows increasing knowledge about HIV and HIV resources, through participatory dialogue with health educators, did not have a statistically significant impact on the rate of HIV testing in the given population (Aronowitz et al., 2018; Lidong et al., 2017; Lin et al., 2017; Sabato, 2015; Xu et al., 2019). However, further research on how participatory dialogue among peers may be needed to assess whether the participatory dialogue construct could be more impactful when done in a different setting (Wong et al., 2019). Furthermore, when considering perceived benefits (advantages) and perceived risks (disadvantages) impact on motivation to initiate HIV screening, many studies found significant relationships with HIV

screening rates (Anwuri et al. 2017; Ayodele, 2017; James et al., 2019; Kort et al., 2017; Lin et al., 2017).

Hypothesis 2

I also set out to find if the constructs of multi-theory model of health behavior change—emotional transformation, practice for change, and changes in the social environment (independent variables)—are associated with the decision to sustain HIV screening (dependent variable) by college-aged people when controlling for demographical factors like age, gender, educational background, and work status. The results show a significant relationship that accounted for 36.1% of the variance in the intention for sustenance. This implied that the decision to sustain HIV testing every year was highly predicted and influenced by these constructs. It is noteworthy that when assessed together the three constructs have a statistically significant impact on the variance, but when looked at individually emotional transformation ($\beta = 0.042$, $p = 0.298$) was reported at a p-value of higher than the significance value of 0.05, and practice for change ($\beta = 0.124$, $p = 0.004$) and changes in the social environment ($\beta = 0.104$, $p < 0.001$) were reported at p-values lower than the significance value of 0.05. As a result, emotional transformation was not a significant contributing factor to the sustenance of HIV screening every year from now on while practice for change and changes in the social environment were significant predictors.

These findings also support previous research conducted on changes in the social environment, especially as it pertains to stigma among friends, family and health professionals (James & Ryan, 2018; Lin et al, 2017; Mukherjee et al., 2018).

Furthermore, statistical significance for practice for change agree with previous research that having resources more available to college-aged students could increase HIV testing (Caldeira et al., 2013; Fernandez et al., 2018). Through this study it was difficult to target specific students at existing colleges and universities within the San Joaquin Valley, as there are many barriers to recruiting and conducting research on students at college campuses and universities. As a result, college-aged people were recruited regardless of enrollment to examine the relationship within this high-risk population. However, further research should be conducted using the multi-theory model of health behavior change to assess college students on college campus. Given that accessibility and being able to overcome obstacles in the form of being able to practice for change was statistically significant for sustaining HIV testing among college aged people, future research could continue to contribute to social change by increasing HIV screening services on college campuses. This study, although provides a good foundation to assess college students on college campus of colleges and universities in the San Joaquin Valley, there is still a gap in the literature.

Limitations of the Study

This study followed a cross-sectional study design. As a result, the exposure and outcome are often assessed at the same time, which limits that ability to assess a temporal relationship between the outcome and exposure (Solem, 2015). The study design is also susceptible to potential recall bias (Choi et al., 2020), if the respondent cannot remember if they have ever been tested for HIV. In addition, social desirability bias is a tendency for people to be reflected in a positive way to society (Holden & Passey, 2019). As a

result, survey responses may be skewed among people who have never received an HIV test but feel it is more socially acceptable to respond that they have. If researchers anonymize the study, social desirability bias could be reduced. However, a limitation to conducting anonymous survey could lead to missing data or conflicting responses within the same survey that a researcher cannot follow up (Salazar, 2015). As a result, there is a potential for greater response bias due to a potential lack of understanding and in ability to follow up. Researchers can assess the reading level of their questions to increase understanding of the survey.

Another limitation of a survey-based study is response rates leading to sampling bias. Using a convenience sample could lead to a low sample collected due to poor response rates or a sample bias where the responses collected are from a sample that is not representative of the population. However, there are steps to mitigate this bias through better survey design by keeping the survey short and accessible or during analysis by using post-survey adjustment techniques (Turk et al., 2019). Future studies either replicating this research or working on behavior change of other health-related issues should endeavor to include test-retest reliability assessment, which was not conducted with this study. Although test-retest reliability was not used in this study, intention as proxy for measure of actual behavior was used.

Recommendations

Epidemiological trends show college-aged people at the greatest risk of being positive for HIV but not being tested (Minority HIV/AIDS Fund, 2020). This study adds to the body of knowledge and further validates the multi-theory model of health behavior

change as it pertains to understanding factors associated with behaviors and attitudes toward change in health behaviors. The findings of this study provide targeted approaches that can be used to increase initiation and sustenance of HIV testing in the San Joaquin Valley.

Based on the findings, adjusting practices in local clinics that focus on behavioral confidence and changes in the physical environment can have the greatest impact on initiating HIV screening within the San Joaquin Valley. More specifically, health educators or health practitioners can work with patients to set appointment dates for HIV screening and generate a concrete plan for future testing. Furthermore, these services should be scheduled at sites that are accessible and convenient for the participant to ensure that the resources are readily obtainable and available. This can be done through targeting rural federally qualified health centers or FQHC clinics to ensure that there is access to HIV screening services that are closer to people who live in rural areas.

In addition, working with individuals to support their practice for change and changes in their social environment can have the greatest impact on sustaining HIV screening in the San Joaquin Valley. This can be fulfilled through health educators and health practitioners working with patients to understand obstacles that would inhibit the practice for change. This way they can work with the patients to find an appointment time that works for them while mitigating potential barriers. Furthermore, providing resources to support groups and destigmatizing HIV testing through public health campaigns can change an individual's social environment by decreasing negative stigmas.

Changes to the approach of practitioners within primary care offices in the San

Joaquin Valley are needed to address the HIV epidemic. Young adults ages 18–34 make up many new cases in California (CDPH, 2019). Although major counties have experienced a decline in their new HIV infection rates, the San Joaquin has experienced year over year increases in new HIV infection rates. Adapting the components and constructs of the multi-theory model of health behavior change into a screening tool can better target the support needed for patients to increase their initiation and sustenance of HIV screening. Doing this would require future researchers to conduct efficacy and effectiveness studies (Streiner, 2002). Using a single clinical site, two different groups could be recruited to compare the difference between the two groups in relation to the differences within the groups. Parametric statistical tests, such as *t* test or analysis of variance (ANOVA), can be used to evaluate the statistical significance. By taking this approach, researchers can avoid potential Type II error in concluding that there is no significant effect, when there may be a significant effect, because an efficacy study had not been conducted first (Streiner, 2002). If the efficacy study did show significant findings, then research could investigate the research for the effectiveness study's failure, rather than dismissing the treatment all together (see Steiner, 2002). If efficacy study findings are significant then an effectiveness study can be introduced with less restrictions and testing if the intervention can work in real life.

Implications for Social Change

Social change demands that individuals and organizations find ways to make positive changes in their lives and the lives of the people in the community at large. Specifically, 1 in 7 of those individuals do not know they have HIV (CDC, 2020). This

means that 14% of people living with HIV are unknowingly transmitting the diseases, because they did not get screened for HIV. As a result, this study focused on health behavior change of individuals but also recommends changing practice in the primary care clinical setting to support change. The implication of this study is that through health behavioral changes individuals and primary care practitioners can effectively improve in the quality of life for people in the San Joaquin Valley. This is accomplished by leveraging public health practitioners that understand the importance of health programs in improving the health status of individuals and communities.

As it pertains to implications for primary care practice in the San Joaquin Valley, the results of this study demonstrate that development and use of a tool using the constructs of the multi-theory model of health behavior change could lead to a more targeted approach to our community, which can lead to increased HIV screening. In addition, primary care practitioners should receive more education on the constructs of the multi-theory model of health behavior change and the statistically significant impact it has on changing HIV screening behaviors. By educating the future of primary care practitioners, real change could be integrated into practice. With future research, policy changes can affect the way HIV screening is provided to college age students.

Based on the study findings, creating policy where all universities and colleges are required to provide HIV screening can also help increase the likelihood of college-aged people to initiate and sustain HIV testing. Finally, public health departments could also benefit from providing education that helps to address the stigma behind HIV testing. This approach helps to increase the likelihood of college-aged people initiating and

sustain HIV testing. All this combined are needed to help disseminate and promote the positive health information to reduce HIV transmission in the San Joaquin Valley and enhance the quality of life in the population, thus affecting social change.

Conclusion

Approximately 1.1 million people are currently living with HIV in the United States (CDC, 2020), and young adults ages 18–34 make up most new cases in California (CDPH, 2019). Though major counties have experienced a decline in their new HIV infection rates, the San Joaquin has experienced year over year increases in new HIV infection rates. HIV, especially among high-risk populations like college-aged people, is still a public health problem that needs novel techniques that help to prevent transmission. As a result, this study aimed to create a foundation for future research to create positive social change that contributes to public health strategies addressing HIV transmission in high-risk populations. To this end, this study examined the association of the constructs in the multi-theory model of health behavior change and a participant's willingness to initiate and sustain HIV testing. This study was able to confirm its adequacy as an acceptable theoretic model through a quantitative research method that relied on a multiple regression analysis on two hypotheses. The use of the multi-theory model of health behavior change in this research offers a framework to guide future research to help address the growing number of new HIV infections in the San Joaquin Valley. The variables that were measured in this study determine that there is a statistically significant relationship and should be used to be used to implement positive social change.

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Appendix A: Measuring Change in HIV Screening Behavior Among College Students

MEASURING CHANGE IN HIV SCREENING BEHAVIOR AMONG COLLEGE STUDENTS

Directions: This survey is voluntary, which means you may choose not to complete it or not to answer individual questions. There is no direct benefit of this survey to you but your responses will help in developing effective HIV/AIDS prevention programs. All data from this survey will be kept confidential. Please put an X mark by the response or fill the response that correctly describes your position. Thank you for your help!

1. Have you had a sexual partner in the past six months?
   - | Yes
   - | No

If you answered "No" then you may stop. Thank you for your time. But if you answered "Yes" then please continue.

---

2. Do you consider yourself in a mutually monogamous relationship?
   - Yes
   - No
   - Don't know

If you answered "Yes" then you may stop. Thank you for your time. But if you answered "No" or "Don't know" then please continue.

---

3. Have you been tested for HIV in the past year?
   - | Yes
   - | No

If you answered "Yes" then you may stop. Thank you for your time. But if you answered "No" then please continue.

---

4. What is your gender?
   - Male
   - Female
   - Other, _____

---

6. Do you consider yourself LGBTQ?
   - | Yes
   - | No

---

7. How old are you today? _____ years

---

8. What is your race/ethnicity?
   - White or Caucasian American
   - Black or African American
   - Asian American
   - American Indian
   - Hispanic American
   - Other _____

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9. What type of health insurance do you have?	☐ Private ☐ Public Health Insurance ☐ No insurance
10. Where do you live?	Rural area Semi-urban Urban area
11. What is your class?	Freshmen Sophomore Junior Senior Graduate
12. What is your current overall GPA? (on a 4.00 scale)	Less than 2.49 2.50 – 2.99 3.00 – 3.49 3.50 – 4.00
13. Do you work for wages?	No Yes, _____ average hours per week (put a single number not a range)

	Never	Almost Never	Sometimes	Fairly Often	Very Often
Participatory dialogue: Advantages					
If you get HIV testing you might…					
14. … have peace of mind.					
15. … detect the disease early.					
16. … develop satisfying relationships.					
17. … feel good about yourself.					
18. … be satisfied with your life.					

	Never	Almost Never	Sometimes	Fairly Often	Very Often
Participatory Dialogue: Disadvantages					
If you get HIV testing you might…					
19. … have to make a change which you may not like.					
20. … feel inconvenienced.					
21. … have to bear costs.					
22. … discover that you have HIV.					
23. … feel that others disapprove of you.					

	Not At All Sure	Slightly Sure	Moderately Sure	Very Sure	Completely Sure
Behavioral confidence					
How sure are you that you can get HIV testing…					
24. … this week?					
25. … this week despite being busy?					
26. … this week despite costs?					
27. … this week without getting frustrated?					
28. … this week despite any fears?					

	Not At All Sure	Slightly Sure	Moderately Sure	Very Sure	Completely Sure
Changes in physical environment					
How sure are you that you will…					
29. … have resources to get HIV testing this week?					

	Not At All Sure	Slightly Sure	Moderately Sure	Very Sure	Completely Sure
30. … be able to find a place to get HIV testing this week?					
31. … have opportunity to get HIV testing this week?					

	Not At All Sure	Slightly Sure	Moderately Sure	Very Sure	Completely Sure
Emotional transformation **How sure are you that you can…**					
32. … direct your emotions/feelings to the goal of getting HIV testing every year?					
33. … motivate yourself toward getting HIV testing every year?					
34. … overcome self-doubt in accomplishing the goal of getting HIV testing every year?					

	Not At All Sure	Slightly Sure	Moderately Sure	Very Sure	Completely Sure
Practice for change **How sure are you that you can…**					
35. … keep a self-diary/journal/record to monitor getting HIV testing every year?					
36. … be able to get HIV testing every year if you encounter barriers?					
37. … change your plan for getting HIV testing every year if you face difficulties?					

	Not At All Sure	Slightly Sure	Moderately Sure	Very Sure	Completely Sure
Changes in social environment **How sure are you that you can get the help of a…**					
38. …family member to support you with getting HIV testing every year?					

	Not At All Sure	Slightly Sure	Moderately Sure	Very Sure	Completely Sure
39. …friend to support you with getting HIV testing every year?					
40. …health professional to support you with getting HIV testing every year?					

	Not At All Likely	Somewhat Likely	Moderately Likely	Very Likely	Completely Likely
Behavior change: Initiation **How likely is it that you will…**					
41. … get HIV testing in the upcoming week?					

	Not At All Likely	Somewhat Likely	Moderately Likely	Very Likely	Completely Likely
Behavior change: Sustenance **How likely is it that you will…**					
42. … get HIV testing every year from now on?					

Thank you for your time!

SCORING

Construct of advantages: Scale: Never (0), Almost never (1), Sometimes (2), Fairly often (3), Very often (4). Summative score of Items 14-18. Possible range: 0- 20. High score associated with likelihood of initiation of behavior change.

Construct of disadvantages: Scale: Never (0), Almost never (1), Sometimes (2), Fairly often (3), Very often (4). Summative score of Items 19-23. Possible range: 0- 20. Low score associated with likelihood of initiation of behavior change.

Subtract disadvantages score from advantages score to calculate **participatory dialogue** construct score. Positive score will be indicative of behavior change.

Construct of behavioral confidence: Scale: Not at all sure (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4). Summative score of Items 24-28. Possible range 0-20. High score associated with likelihood of initiation of behavior change.

Construct of changes in physical environment: Scale: Not at all sure (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4). Summative score of Items 29-31. Possible range 0-12. High score associated with likelihood of initiation of behavior change.

Construct of emotional transformation: Scale: Not at all sure (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4). Summative score of Items 32-34. Possible range 0-12. High score associated with likelihood of sustenance of behavior change.

Construct of practice for change: Scale: Not at all sure (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4). Summative score of Items 35-37. Possible range 0-12. High score associated with likelihood of sustenance of behavior change.

Construct of changes in social environment: Scale: Not at all sure (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4). Summative score of Items 38-40. Possible range 0-12. High score associated with likelihood of sustenance of behavior change.

For **modeling initiation** dependent variable can be Item 41: not at all likely (0), somewhat likely (1), moderately likely (2), very likely (3), and completely likely (4) and multiple regression can be used. For **modeling sustenance** dependent variable can be Item 42: not at all likely (0), somewhat likely (1), moderately likely (2), very likely (3), and completely likely (4) and multiple regression can be used.

Flesch Reading Ease: 78.8
Flesch-Kincaid Grade Level: 3.8

Appendix B: Letter of Permission

Re: Permission: Instrument for HIV Screening Behavior in College Students

Manoj Sharma <[redacted]

Sat 1/30/2021 8:12 AM

To: Joshua Medina [redacted]

Greetings Joshua!

Thank you for your request for permission to use my instrument, "**Measuring change in HIV screening behavior among college students**" for one time use in your dissertation. I hereby grant you permission with due credit for one time use of this instrument for your dissertation and any manuscript arising out of your work. Best of luck!

Kindest regards and love to all of you.

Manoj

Dr. Manoj Sharma

On Sat, Jan 30, 2021 at 7:36 AM Joshua Medina <[redacted] wrote:

> Dr. Sharma,
>
> I am writing to formally request permission to use your copyrighted material in my dissertation. The instrument I am requesting to use is for HIV screening behavior in college students.
>
> Thank you so much for helping me through my dissertation!
>
> With much appreciation,