

Spring 2022

Application of the PRECEDE-PROCEED Planning Model in Designing an Infant Mortality Mitigation Strategy

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Application of the PRECEDE-PROCEED Planning Model in Designing an Infant Mortality
Mitigation Strategy

By

Alexandria Hawkinson

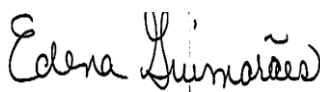
Submitted in Partial Fulfillment
of the Requirements for
Graduation with Honors from the
South Carolina Honors College

May 2022

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THESIS SUMMARY

In this paper, I present a clinical intervention strategy aimed at mitigating infant mortality rates through application of the PRECEDE-PROCEED planning model. These steps involve analyzing the social implications of infant mortality among non-Hispanic black women in the state of South Carolina and identifying contributing factors of preterm birth via a thorough literature review. After concluding that adverse childhood experiences are linked to preterm birth and its contributing factors, I utilize the Health Belief Model to develop a health promotion program titled Empowered Mothers of South Carolina. This program works towards increasing acknowledgment of adverse childhood experiences and implementation of trauma-informed care within the clinical setting.

INTRODUCTION

Infant mortality rate (IMR) is an infant's probability of death before his or her first birthday and is expressed as the number of deaths per 1,000 live births (The Global Health Observatory [GHO], 2022). This value provides important information about a child's survivability as well as the environmental conditions in which they live, including access to quality healthcare (GHO, 2022). While public health programs may reduce IMR by providing direct financial and material resources, their goal is to improve economic well-being and not IMR directly. Thus, other approaches must be utilized (Heisler, 2012). One study which highlights the importance of healthcare professional involvement in IMR reduction concluded that a negative association exists between primary care physician prevalence and IMR (Russo et al., 2019). While healthcare professionals can contribute to overall IMR reduction, they can also play a role in mitigation of the racial disparity gap. Between 2000 and 2018, Black patients received poorer care than White patients in 40% of quality measures. Implicit bias and culturally incompetent care prevent individuals in the Black community from using healthcare services and developing strong patient-provider relationships (Barnes, 2018). Thus, healthcare professionals play a major role in overall healthcare utilization and IMR reduction, especially among non-Hispanic Black women.

To effectively combat IMR, healthcare professionals must address the individualized needs of their patients. It is important to note that both environmental factors and individual experiences can impact one's health during critical periods of development. Adverse childhood experiences (ACEs) are traumatic events in early life which can result in excessive levels of stress and altered brain development (Robert Wood Johnson Foundation, n.d.). Cognitive impairment and inappropriate coping mechanisms brought on by ACEs result in adoption of

health risk behaviors, which in turn contributes to acute and chronic illnesses which are linked to preterm birth. While ACEs contribute to inappropriate coping mechanisms and adoption of health risk behaviors, individual trauma relies heavily on community context.

Communities, whether these are geographically or culturally defined, can facilitate or impede trauma recovery through cultural values and norms (Substance Abuse and Mental Health Services Administration [SAMHSA], 2014). Those which provide trauma recognition and self-determination contribute to individual healing and recovery while communities who avoid or misunderstand trauma contribute to re-traumatization (SAMHSA, 2014). The way in which communities respond to individual trauma lays the foundation for individual recovery (SAMHSA, 2014). Addressing individualized needs within the clinical setting would require the adoption of trauma-informed care (TIC), in which healthcare professionals approach the care as if patients are more likely to have past trauma than not (SAMHSA, 2014). Thus, care is not necessarily about treating the conditions which arose from said trauma but rather providing supportive services to promote healing in a safe environment. Utilizing the six principles and four approaches of TIC, healthcare professionals can shift the question of “what is wrong with you” to “what happened to you” (Refer to Table 1).

<i>Table 1. Trauma Informed Care</i>	
Principles	4 “R” Approaches
1. Safety 2. Trustworthiness 3. Peer Support 4. Collaboration and mutuality 5. Empowerment 6. Cultural, historical, and gender issues	<i>Realizes</i> the impact of trauma <i>Recognizes</i> signs and symptoms <i>Responds</i> by integrating knowledge <i>Resist</i> re-traumatization

Planning and designing an appropriate TIC implementation program can be challenging and time-consuming, which is why health intervention models are so important. One model which would be most beneficial for TIC implementation is the PRECEDE-PROCEED Model. Developed for public health program planning, this model provides a step-by-step framework that focuses on conceiving, planning, implementing, and evaluating health promotion programs (See Appendix A). Consisting of five phases, the PRECEDE component of this model stands for predisposing, reinforcing, and enabling constructs in educational and environmental diagnosis and evaluation (Center for Community Health and Development, n.d.). Thus, this portion of the model encompasses health problem analysis and program planning and consists of five different phases:

- Phase 1 (Social Assessment): Health problem analysis and identification health program's desired result.
- Phase 2 (Epidemiological Assessment): Identification of the health problem population target and setting.
- Phase 3 (Behavioral and Environmental Assessment): Identification of behavioral, environment, and biological factors that impact health problem.
- Phase 4 (Educational and Ecological Assessment): Identification of predisposing, enabling, and reinforcing factors, which, if modified, could result in behavioral health change.
- Phase 5 (Administrative and Policy Assessment): Modification of behavioral change model and identification of external factors which could prevent proper implementation of health promotion program.

The PROCEED component of the model stands for policy regulatory and organizational constructs in educational and environmental development (Center for Community Health and Development, n.d.). Thus, this component involves actual program implementation and evaluation and consists of the four final phases:

- Phase 6 (Implementation): Design and implementation of program plan according to availability of personnel, resources, and funds.
- Phase 7 (Process Evaluation): Evaluation of health promotion program implementation.
- Phase 8 (Impact Evaluation): Evaluation of behavioral changes in target population and stakeholders.
- Phase 9 (Outcome Evaluation): Evaluation of program outcome objectives.

The PRECEDE-PROCEED planning model is an appropriate framework for TIC clinical implementation as it provides structured steps for critical analysis of IMR and its respective program planning. It also considers the way in which external forces could potentially hinder program implementation, which is something other public health planning models often ignore (Center for Community Health and Development, n.d.). The PRECEDE-PROCEED model is adaptable, which is important for this program as it doesn't involve actual implementation. Thus, phases 7 through 9 will become one phase which involves process, impact, and outcome evaluation planning tools.

PART I - SOCIAL ASSESSMENT

Infant mortality rate (IMR) is the number of infant deaths occurring before the first year of life per 1,000 live births (Centers for Disease Control and Prevention [CDC], 2021). While IMR provides insight into maternal and infant health, it is also often used as an indicator for the general health status of a nation (CDC, 2021). A 2003 analysis of data obtained from the World

Bank and World Health Organization for 180 countries found a strong association between IMR and disability-adjusted life expectancy (Reidpath & Allotey, 2003). This correlation demonstrates that IMR is influenced by structural factors within the community and quality of life among its members. Thus, IMR is not just a measure of infant deaths, but rather a measure of mortality and morbidity among the entire population (Reidpath & Allotey, 2003).

The United States Environmental Protection Agency (EPA) analyzes infant mortality rates, in addition to general mortality and life expectancy rates, to assess health trends in America. IMR reflects the health status of the nation and, more specifically, the quality and accessibility of maternal and infant health care (EPA, 2021). Despite a 3% decrease in infant deaths between 2018 and 2019, the U.S. experienced a nonsignificant reduction in IMR from 5.67 to 5.58 and continued to rank 33 out of 38 among other developed countries in the Organization for Economic Co-operation and Development (National Center for Health Statistics [NCHS], 2021; Organization for Economic Co-operation and Development [OECD], 2022). Due to the severity of infant death rates in the United States and its impact on community health, it is critical to develop evidence-based health promotion programs that are aimed at IMR reduction.

PART II - EPIDEMIOLOGICAL ASSESSMENT

Just as in 2018, the top five leading causes of death among infants in the U.S. in 2019 were congenital malformations (21%), disorders related to short gestational age and low birthweight (17%), maternal complications (6%), sudden infant death syndrome (6%), and unintentional injuries (6%) (NCHS, 2021). While congenital malformations were the number one cause of infant deaths, most birth defects are caused by a variety of factors which are not quite understood and are often unpreventable (CDC, 2021). Data from the National Center for Health Statistics found that preterm birth (PTB) was the most influential factor of IMR disparities

worldwide (2009). In fact, they concluded rates of infant deaths in the U.S. could be reduced by one-third if PTB rates dropped by half (NCHS, 2009). Therefore, PTB is a logical focus area for public health interventions.

With a typical pregnancy lasting 40 weeks, PTB is defined as any birth occurring before the start of the 37th week of pregnancy and in 2020, accounted for more than 10% of the 3,613,647 U.S. births (Mayo Clinic, n.d.; NCHS, 2022). While short gestation periods can cause significant health problems, it also disproportionately affects infants born to non-Hispanic Black mothers. Within the same year, 9.10% of births to non-Hispanic White women were PTB compared to 14.36% of births to non-Hispanic Black women (NCHS, 2022). This contributes to disparities in infant mortality with non-Hispanic Black women and non-Hispanic White women, having an IMR of 10.62 and 3.38 respectively (NCHS, 2021). Because of these disparities, non-Hispanic Black women, specifically those of childbearing age, will act as the primary target population for the current proposal.

In 2019, 14 states had an IMR significantly higher than the national average of 5.58, one of these being South Carolina (NCHS, 2021). Between 2018 and 2019, infant deaths in South Carolina due to low birth weight increased by 17.2%. During this same time, deaths due to maternal complications increased by 43.5%, and deaths due to sudden infant death syndrome increased by 35.7% (South Carolina Department of Health and Environmental Control [SCDHEC], 2020). Total infant mortality and neonatal mortality among non-Hispanic White women decreased 9.8% and 11.8%, respectively, while postneonatal mortality remained the same (SCDHEC, 2020). However, total infant mortality, neonatal mortality, and postneonatal mortality among non-Hispanic Black women increased 0.9%, 1.3% and 2.8%, respectively (SCDHEC, 2020). Additionally, non-Hispanic White women had an IMR of 4.6 while non-

Hispanic Black women had an IMR of 11.2, making the racial disparity gap the widest it has been in the last five years (SCDHEC, 2020). According to SCDHEC, the total rate of infant deaths due to disorders related to short gestation and low birth weight among non-Hispanic Black women between 2017 and 2019 was over double the rate compared to non-Hispanic White women (See Appendix B). In 2020, 10% of babies born to White mothers were premature compared to 15.66% of babies born to Black mothers, making the state average 11.81% (NCHS, 2022). The substantially high state-wide IMR as well as its increasing racial disparities, makes South Carolina an ideal setting for this study.

Key Stakeholders

Stakeholders are extremely important for this project. After accounting for confounding variables associated with infant mortality, Russo et al. (2019) concluded that an increase of one primary care physician per 10,000 individuals was associated with a 4.5% reduction in mean IMR. The negative association between primary care physicians and IMR demonstrates the importance of healthcare professional involvement (Russo et al., 2019). Quality of care is another significant factor, as many non-Hispanic Black women have stated they received inadequate healthcare due to racism present within the medical field (Barnes, 2018). In fact, healthcare utilization among non-Hispanic Black women has been found to increase when providers utilize an Afrocentric perspective during care (Barnes, 2018). Because healthcare provider frequency and quality of care correlates with IMR reduction and care utilization among non-Hispanic Black women respectively, healthcare providers will act as key stakeholders in the proposed project.

SC Hospital Association (SCHA) is a not-for-profit 501(C)(3) organization whose mission is to make South Carolina the healthiest state in the nation by helping the state's

hospitals and healthcare systems provide the best possible care (SC Hospital Association [SCHA], 2020). With over 100 member hospitals and healthcare system members, SCHA funds and distributes resources for research, shares effective innovations and practices, and actively encourages collaboration among facilities and community members (SCHA, 2020). Acting as a key stakeholder, this organization's role in this project is to spread awareness of infant mortality disparities and promote clinical engagement in IMR reduction and PTB intervention among all hospital and healthcare facility members.

In order to ensure this project covers all geographic areas of South Carolina, other key stakeholders in this project will include prominent healthcare facilities in the four regions of the state. Thus, Prisma Health will act as the primary stakeholder for the Upstate region, McLeod Health for the Pee Dee region, Lexington Medical Center for the Midlands, Medical University of South Carolina (MUSC) for both the Midlands and Low State region, and Roper St. Francis Healthcare for the Low state region. Of the five healthcare systems listed, there are 37 facilities in total and their key role is to ensure implementation of culturally competent, quality care. Finally - and most importantly - non-Hispanic Black women of childbearing age will act as major stakeholders in this program. A community-based sample will be recruited to lend their voice in program pre-planning and evaluation.

Program Purpose

While IMR sheds light on maternal and infant health, it is also used as an indicator of community health status. Thus, mitigating IMR is not just about improving infant health but improving the health status and quality life of entire communities. Research has failed to understand the impact ACEs have on IMR and how healthcare professionals play a role. Because disparities exist across the globe, within the United States, and across subpopulations within

South Carolina, further IMR analysis is crucial. Therefore, the purpose of this project was to utilize the PRECEDE-PROCEDE in creation of a health promotion program aimed at reducing IMR through healthcare professional ACE acknowledgement and TIC implementation.

PART III - BEHAVIORAL AND ENVIRONMENTAL ASSESSMENT

To address infant death inequalities, a literature review was conducted using keywords “preterm birth, premature birth, and risk factors” in the American Journal of Obstetrics and Gynecology. The search was narrowed down by only selecting articles based in the United States within the last five years. Out of the 960 original results, 31 research articles matched these criteria. The findings of the literature review demonstrate the numerous factors which contribute to preterm birth among all individuals (Refer to Table 2).

Table 2. Literature Review of PTB Concluding Factors

Author(s)	Sample Size	Study Objective	Concluding Risk Factors
(Perez et al., 2017)	Women with singleton first-births between 20-42 weeks in 2012 n = 1,148,392	Examine adolescent's risk for PTB	Pregnancy in adolescence (<16) due to low BMI and less than recommended pregnancy weight gain; Older women factors include race (Black) and tobacco use
(Plagge et al., 2019)	All live births in Ohio from January 2006 through December 2015 n = 1,463,506	Examine risk factors associated with extreme PTB	Lack of prenatal care, prior preterm birth, smoking in first two semesters, chronic hypertension, Black race, inadequate weight gain, gestational diabetes, and preeclampsia
(Oakes et al., 2020)	Prospective cohort study of women in first trimester analyzed throughout pregnancy n = 848	Examine relationship between early pregnancy stress levels and depression and PTB	Moderate to high stress in early pregnancy
(Green et al., 2020)	All live births in the US, 2015-2017 n = 4,637,161	Examine the association between PTB and race among women with no medical risk factors	Women other than non-Hispanic whites, with exception of Hispanic women; PTB highest among Black women
(Wallace et al., 2017)	Live births in Ohio, from 2006–2012 with previous history of premature birth n = 36,432	Examine the pattern of trimester-specific smoking cessation among recurrent PTB pregnancies	Smoking during pregnancy; cessation in third trimester
(Girault et al., 2018)	Women with singleton pregnancies delivering >22 weeks in a tertiary university	Examine association between uterine leiomyomas and myomectomy and PTB	Uterine leiomyomas; persists after myomectomy

	hospital maternity unit from January 2011 through September 2015 n = 19,866		
(Chambers et al., 2019)	Singleton births between 20-44 weeks gestation in California Birth Cohort Database n = 2,320,020	Examine racial/ethnic disparities in risk of PTB among women with PTB risk factors	Hypertension, preeclampsia, diabetes, infection, mental illness, smoking, drug use, stress, racism
(Smid et al., 2017)	Women born prematurely from 1960-1996 who had first PTB between 2005-2009 in Virginia n = 71,676	Examine differences in intergenerational PTB risks among non-Hispanic white and non-Hispanic Black women	Intergenerational PTBs among Black women especially those born less than 34 weeks
(Papageorgiou et al., 2021)	n = 2184	Examine association between COVID-19 during pregnancy and preeclampsia	COVID-19 associated with preeclampsia independently and in additive factor associated with PTB
(Baer et al., 2018)	Singleton births in California between 22 and 42 weeks gestation in 2007-2012 with STI n - 13,477	Examine the association between PTB and maternal STI status	Syphilis associated with PTB Gonorrhea associated with some PTB subtypes
(Baer et al., 2019)	Singleton births in California between 2007 and 2012 n = 2,892,756	Examine the association between PTB and emergency department (ED) and/or hospitalization visit due to UTI by pregnancy trimester	UTI, specifically within second trimester

(Bell et al., 2021)	Singleton births to youth (<24) in California between 2011-2017 n=69,575	Examine the associations between maternal characteristics and PTB among youth	Younger than 15, smoking, inadequate prenatal care, chronic hypertension, drug use
(Karasek et al., 2019)	First and second singleton births between 22 and 42 weeks n = 253,514	Examine association between race/ethnicity and/or socioeconomic status and recurrence of PTB	Prior PTB
(Calix et al., 2020)	Cohort of singleton births from 2013 to January 2020 n = 15,498	Examine the association between pre-pregnancy BMI and PTB; determine association between BMI and medically indicated PTB compared to spontaneous PTB	Class I obesity (after accounting for socioeconomic status, diabetes, and hypertension disease of pregnancy)
(Polnaszek et al., 2020)	Cohort of spontaneous laboring nulliparous women with singleton pregnancies 34 weeks or beyond from 2010-2014 n = 2,234	Identify risk factors associated with late spontaneous PTB in nulliparous women	Gestational diabetes
(Carroll et al., 2017)	Preterm births at Boston Medical Center from July 1, 2014, to March 31, 2016 n=412	Identify rate, indication, and severity of PTB at an urban safety net hospital	Hypertension, high BMI, diabetes
(Rainey et al., 2018)	Secondary prospective cohort of pregnant women n = 2,980	Examine the association between BMI < 20 and PTB; examine the association between low BMI and inflammatory, cytokines, cervical length, and birth weight	BMI < 20

(Schmidt et al., 2019)	Secondary prospective cohort of pregnant women n = 519	Examine the association between stress and the cervicovaginal (CV) space immune response and spontaneous PTB	Stress, low CV immune response, Black race
(Madzia et al., 2019)	Retrospective cohort study of Ohio vital statistics birth records from 2007-2015 n = 1,124,299	Examined the association between low pre-pregnancy BMI and PTB and the effects of gestational weight gain	Pre-pregnancy low BMI, interpregnancy interval, diabetes, hypertension
(Panelli et al., 2021)	Veteran Health Administration database: singleton births among veterans with active post-traumatic stress disorder (PTSD) between 2005 and 2015 n = 3,398	Examine the factors associated with PTB among women with active PTSD	PTSD, preeclampsia, mental health disorders (anxiety, depression...)
(Meyer et al., 2021)	Nested case-control study from cohort analyzing social determinants of health (SDH) among Black women at the University of Cincinnati Medical Center from 2011-2020 n = 261	Examine the differences in SDH between non-Hispanic Black women who experienced PTB and non-Hispanic Black women who experienced term birth	Lack of social, emotional, and financial support, lack of joy and resilience, late or lack of prenatal care, lack of neighborhood recreational spaces, feeling of a lack of autonomy, food insecurity
(Tvina et al., 2021)	Retrospective case-control study of hospital pregnancy records and race self-identification (non-Hispanic Black women) n = 2,771	Examine the association between proximity of green space and rates of PTB among non-Hispanic Black women	Far proximity from green space

(McKinney et al., 2016)	Ohio population-based retrospective cohort study of all births and infant mortalities n = 1,139,222	Examine the association between short interpregnancy intervals on infant mortality	Short interpregnancy intervals, especially less than 6 months
(Ryckman et al., 2018)	Births in California from 2007 and 2012 n = 2,870,449	Examine the association between maternal dyslipidemia and PTB	Dyslipidemia, specifically medically indicated PTB
(Lipworth et al., 2021)	Twin pregnancies that were followed up in a tertiary center between 2000 and 2014 n = 1,274	Identify optimal range of gestational weight gain in twin pregnancies and examine the association between weight outside of the range and PTB	Gestational weight gain less than recommended range
(Sun et al., 2020)	NICHD Consortium on Safe Labor – 19 US hospitals between 2002 and 2008 n = 13,805	Identify risk factors associated with spontaneous PTB	Prior PTB, placental abruption and less than high school education
(Koire et al., 2018)	Retrospective cohort study using academic center database of deliveries between August 2011 and July 2017 n = 23,816	Examine the association between PTB and family history of PTB	Intergenerational PTB
(Watad et al., 2020)	Women at gestational age of 24-34 weeks with cervical length less than 20mm n = 73	Examine the association between PTB and physical activity	Lack of physical activity
(Tolcher et al., 2017)	Retrospective cohort study using single center database of deliveries from August 2011 to June 2016 n = 16,379	Examine the association between obesity and PTB by race	Smoking, history of PTB, gestational diabetes, obesity (among Black women)

(Venkatesh et al., 2018)	Nested case-control study of PTB enrolled in birth cohort at Brigham and Women's Hospital n = 461	Examine the association between depression during pregnancy and PTB	Depression (Spontaneous PTB)
(Dotters-Katz et al., 2017)	Retrospective cohort of women from tertiary care center between 2005 and 2015 n = 282	Examine the association between PTB and recurrent PTB	History of PTB less than 28 weeks

The results of the literature review demonstrate the complexity of factors which are associated with preterm births. These factors can be further categorized as either behavioral, social-environmental, and biological (Refer to Table 3). Behavioral choices are directly related to a person's environment and resource availability. Subsequently, this can lead to the increased risks of chronic diseases, mental health issues, and pregnancy-related problems. Thus, it would be significant to look beyond preterm birth contributing factors and focus on the foundational elements of individual health.

<i>Table 3. Factors Associated with PTB</i>	
Behavioral	
Categories	Subcategories
Behavioral Choices	Drug use Lack of physical exercise Tobacco use
Inappropriate Family Planning	Adolescence pregnancies Inadequate pregnancy intervals Sexually transmitted diseases Urinary tract infections
Social-Environmental	
Categories	Subcategories
Neighborhood Context	Food insecurity Lack of educational opportunities Lack of prenatal care Poor quality healthcare Insufficient infrastructure
Social Interactions	Lack of social support Racism
Biological and Other	

Categories	Subcategories
Chronic Diseases	Diabetes Dyslipidemia Hypertension Myomas
Weight-Related	Less than recommended weight gain during pregnancy Low BMI Obesity (high BMI)
Mental Health	Mental health disorders (anxiety, depression, PTSD...) Stress
Pregnancy-Related Health Problems	Gestational diabetes Preeclampsia Family history of PTB Prior PTB

Social Determinants of Health

According to Healthy People 2030, social determinants of health (SDOH) are the conditions in which a person lives and functions and can be divided into the following five domains:

- Economic stability
- Education access and quality
- Healthcare access and quality
- Neighborhood and built environment
- Social and community context

Examples include grocery store access, exposure to environmental toxins, and community incarceration rates (Office of Disease Prevention and Health Promotion, n.d.). These have a major impact on individual health and well-being and contribute to mass disparities. While community members may be exposed to similar external factors, individuals react differently and may require varying clinical treatment (AHRQ, 2020). This is referred to as an

individual's social needs and includes dealing with factors such as financial strain, a lack of social support, and trauma (AHRQ, 2020). Thus, it is important for healthcare providers to understand and address both the social determinants of health and individualist needs of their patients when combatting preterm birth.

Adverse Childhood Experiences

While addressing social determinants of health in clinical practice is important, it is also necessary to note that both environmental factors and individual experiences can impact one's health during critical periods of development. Adverse childhood experiences (ACEs) are traumatic events in early life which can result in excessive levels of stress and altered brain development (Robert Wood Johnson Foundation [RWJF], n.d.). Such experiences can be divided into the following three domains: abuse, neglect, and household dysfunction (See Appendix C).

The original ACE study, conducted by the CDC and Kaiser Permanente between 1995 and 1997, sought to examine the long-term effects of abuse and household dysfunction. With two-thirds of participants reporting at least one ACE, the study concluded that ACEs are not only common among the general population, but that environmental factors make certain groups of people more vulnerable (Felitti et al., 1998). Having been linked to numerous illnesses throughout the years, the original ACE study also found a positive correlation between the number of ACEs experienced and negative health outcomes (Felitti et al., 1998). Thus far ACEs have been linked to a variety of issues ranging from acute health problems to severe psychological disorders (Hughes et al., 2017; Petrucci et al., 2019). Some of these conditions are outlined in Table 4.

Table 4. Factors Associated with ACEs

Chronic Diseases and Acute Illnesses	Mental Health and Quality of Life	Behavioral Choices and Environmental Conditions
Cancer Cardiovascular disease Diabetes Gastrointestinal disease Headache Hypertension Liver disease Memory impairment Obesity Respiratory disease Sexually transmitted diseases Sleep problems Stroke	Anxiety Behavioral problems Depression Hallucinations Low life satisfaction Psychological stress Suicide	Adolescent pregnancy Drug Use Heavy alcohol use Physical inactivity Risky sexual behavior Smoking Tobacco use Violence perpetration/victimization

Comparing both the conditions linked to ACEs and the concluding factors associated with preterm birth, there are many similarities. In fact, a relationship between preterm birth and ACES has been determined in numerous studies (Sulaiman et al, 2021). According to Sulaiman and her colleagues, seven out of nine of the studies analyzed in their systematic review suggested an increased risk of preterm birth after ACE exposure (2021). Additionally, they suspected that risk factors, such as smoking and drinking, act as mediating factors between the two (Sulaiman et al., 2021). This indirect relationship between ACES and preterm birth can be further explained by the conceptual framework of the original ACE study (Felitti et al., 1998). The ACE pyramid demonstrates how ACEs impede social, cognitive, and emotional development that in turn can lead to adoption of risky health behaviors which cause disease and early death (See Appendix C).

Toxic Stress

Such developmental delays are the body's physiological response to prolonged stress response activation. During a stressful situation the body releases adrenaline, leading to increased heart rate and elevated blood pressure (National Scientific Council on the Developing Child [NSCDC] 2014). When the situation subsides or emotional support is provided, the body returns to its natural state (NSCDC, 2014). However, when the situation is ongoing and the stress response never de-activates, the body becomes overloaded (NSCDC, 2014). This phenomenon, referred to as toxic stress, interferes with children's development and can lead to mental disorders such as anxiety and depression (NSCDC, 2014). Prolonged stress can reduce neural connections in the brain, resulting in a poorly controlled stress response system and unhealthy coping mechanisms (NSCDC, 2014). Thus, cognitive impairment and inappropriate coping mechanisms brought on by ACEs result in adoption of health risk behaviors, which in turn contributes to acute and chronic illnesses which are linked to preterm birth.

Focus

While all the PTB contributing factors listed in this section are important, some are more influential than others and more readily adaptable (Refer to Table 5). The goal of the program is to improve maternal and infant health overall and mitigate racial disparities by reducing infant mortality rates among non-Hispanic Black women in South Carolina. Adoption of health risk behaviors, such as unsafe sex practices and drug and tobacco use, is not solely the result of individual choice but rather, the accumulative influence of environmental factors, trauma-induced stress on the body brought on by ACEs, and a lack of resources to effectively cope with stress. Thus, risk factors serving as the main focus for reducing PTB and infant death in the current proposal will focus on the patient-provider interaction and ACEs. The target population

is non-Hispanic Black women, specifically those of childbearing age, who are at risk of PTB. To decrease PTB among the target population, the PRECEDE-PROCEED Model will be used to develop a health promotion program focusing on improving the ability of healthcare professionals to serve women in South Carolina who are at high risk for PTB by addressing ACEs during the clinical interaction.

Table 5. Priority Analysis Matrix

	<i>More Important</i>	<i>Less Important</i>
<i>More Changeable</i>	<ul style="list-style-type: none"> ● Support system availability ● Stress coping mechanisms ● Healthcare professional treatment/interactions 	<ul style="list-style-type: none"> ● Family planning education ● Contraception availability ● Policies aimed at decreasing tobacco and drug use
<i>Less Changeable</i>	<ul style="list-style-type: none"> ● ACEs ● Access to prenatal Care ● Adoption of risky health behaviors 	<ul style="list-style-type: none"> ● Race ● Age ● Chronic disease and other health problems ● Socioeconomic status

PART IV - EDUCATIONAL AND ECOLOGICAL ASSESSMENT

To combat the effects of ACEs and ultimately reduce preterm birth and infant deaths, we must alleviate mediating factors by addressing the coping mechanisms associated with toxic stress. Addressing ACEs within the clinical setting would require the adoption of TIC, in which healthcare professionals approach the care as if patients are more likely to have past trauma than not (SAMHSA, 2014). Thus, care is not necessarily about treating the conditions which arose from said trauma but rather providing supportive services to promote healing in a safe environment. Utilizing the six principles and four approaches of TIC, healthcare professionals can shift the question of “what is wrong with you” to “what happened to you”. The table below highlights the predisposing, enabling, and reinforcing factors that influence whether or not

healthcare professionals would be able and willing to implement TIC to address ACEs and reduce the risk of PTB among the target population.

Table 6. Predisposing, Enabling, and Reinforcing Factors of TIC Implementation

Factor Type	Factor	Explanation of Relationship with Behavior
Predisposing (knowledge, values, beliefs)	<p>1. Knowledge about ACEs</p> <p>2. Low impact perception</p> <p>3. Stigma surrounding trauma discussion</p> <p>4. Racial Bias</p>	<p>1. Lack of knowledge surrounding ACEs and their impact on various health conditions, especially PTB, results in healthcare professions omitting their importance in diagnosis and treatment plans (Chung et al., 2012). Disregarding these events and the developmental delays they cause can result in re-traumatization of patients and ineffective care.</p> <p>2. Despite ACEs contributing to millions of cases of preventable diseases, such as diabetes and hypertension, they are most often not addressed in the clinical setting as healthcare professionals do not perceive them as influential to one's health (Chung et al., 2012). Avoiding discussion of traumatic events can lead to re-traumatization, continuation in health risk behaviors, and increased risk of PTB.</p> <p>3. Many healthcare professionals feel discomfort discussing traumatic events with patients. They may feel overwhelmed by the information that they receive and avoid discussing certain topics (Chung et al., 2012). This stigma can make patients feel embarrassed by their conditions, which can lead to re-traumatization and distrust of the medical field.</p> <p>4. Racial bias within the clinical setting contributes to further medical distrust and greater rates of PTB. A 2021 study found that minorities were often stereotyped by healthcare providers as lower class and less educated, resulting in half-hearted treatment plans (Sim et al., 2021). They stated that providers were condescending towards them, ignored their complaints, and avoided physical contact (Sim et al., 2021) Racial bias in the clinical setting contributes to insufficient</p>

		care, medical distrust, and a lack of healthcare utilization among the Black community, which in turn contributes to greater rates of preventable diseases and PTB.
Enabling (barriers & vehicles, skills, availability)	1. Financial implementation 2. TIC skills 3. Time 4. Appropriate Resources	<p>1. While clinical implementation of TIC is a cost-effective method of addressing ACEs and reducing PTB, healthcare professionals admit hesitancy in treatment coding (Chung et al., 2012). Thus, if ACEs and trauma are discussed during the visit, providers may question whether to code their time as mental health treatment. This confusion could prevent healthcare professionals from implementing TIC.</p> <p>2. Providers may lack the proper skills to recognize trauma in patients and/or develop a treatment plan based on it. Thus, this would prevent them from implementing such care.</p> <p>3. Some healthcare professionals state that they don't have adequate time to address trauma during appointments originally designated for another problem. Lack of sufficient time to address complex issues prevents many healthcare professionals from addressing these issues.</p> <p>4. Healthcare facilities may lack appropriate resources for healthcare professionals to implement TIC and/or for patients to receive such care. They may not have sufficient resources to handle certain health problems or recognize trauma (such as questionnaires and trauma-screening assessments). Without proper resources, TIC cannot be implemented.</p>

Reinforcing (social benefits, recognition, appreciation)	<ol style="list-style-type: none"> 1. Quality of care 2. Reduction in patient engagement of health risk behaviors 3. Support by facility board members and staff 	<ol style="list-style-type: none"> 1. Addressing ACEs during clinical interactions can lead to more effective diagnosis and treatment plans and thus, greater quality care. Healthcare professionals would be more inclined to implement this type of care if it proved to be more effective than the traditional. 2. TIC helps individuals develop greater stress coping mechanisms which leads to a reduction in engagement in health risk behaviors, such as unsafe sex practices, which leads to a decrease in prevalence of preventable disease associated with PTB. Healthcare professionals would be more inclined to implement care which reduced rates of disease, specifically PTB among the target population. 3. Standards of care must be consistent across staff members and facilities as trauma can have various definitions. Healthcare professionals would be more willing to implement TIC if they received support from facility board members, such as positive recognition and achievement incentives.
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Mission Statement

Empowered Mothers of South Carolina is committed to reducing rates of PTB birth among non-Hispanic Black women in South Carolina by increasing awareness of ACEs among healthcare professionals and implementing TIC within the clinical setting.

Program Goals

1. Increase awareness of ACEs and their impact on PTB among healthcare professionals.
2. Increase implementation of TIC.
3. Decrease rates of PTB among non-Hispanic Black women.
4. Reduce the IMR racial disparity gap in South Carolina.

Process Objectives

- By January 1st, 2024, program staff will have hosted at least one ACEs educational seminar in all 37 healthcare system stakeholder facilities.
- By January 1st, 2024, all 37 healthcare system stakeholder facilities will receive proper TIC training.
- By January 1st, 2024, program staff will have designated one individual as the TIC evaluation director for each of the five healthcare systems stakeholders.

Impact (Learning) Objectives

- Upon completion of educational seminars, 80% of healthcare professionals will be able to list at least five examples of the association between PTB and ACEs.
- Upon completion of training, at least 80% of healthcare professionals will be able to list the six principles of TIC.
- Upon completion of training, at least 80% of healthcare professionals will be able to describe the four approaches to TIC.

Impact (Behavioral) Objectives

- Six months after the educational seminars, 80% of healthcare professionals will report incorporating ACEs into patient diagnosis and treatment plans.
- Three months after training, 90% of the healthcare providers will report implementing TIC among high-risk patients

Outcome Objectives

- From January 2023 to December 2027, prevalence of PTB among non-Hispanic Black women in South Carolina will decrease 5% from baseline according to data presented by SCDHEC Vital Statistics.
- From January 2023 to December 2027, IMR among non-Hispanic Black women in South Carolina will decrease 5% from baseline according to data presented by SCDHEC Vital Statistics.

PART V - INTERVENTION ALIGNMENT

Program Theory

Based on the program's objectives, the most appropriate behavioral change model to implement is the Health Belief Model (HBM). According to this model, there are six constructs which determine an individual's decision to engage in a particular health action (LaMorte, 2019).

These constructs include:

1. Perceived Susceptibility – Belief of one's chances of getting a certain condition.
2. Perceived Severity – Belief of the seriousness of the condition.
3. Perceived Benefits – Value of adopting new health behavior.
4. Perceived Barriers – Perception of obstacles that prevent adoption and success of new health behavior.

5. Cues to Action – Events, people, or things which trigger someone to change behavior and engage in new health action.
6. Self-efficacy – Confidence in oneself to perform new health behavior.

An individual's likelihood to either engage or not engage in a particular health behavior is influenced by multiple factors and it is important for the successful implementation of a program (See Appendix D). The long-term goal Empowered Mothers of South Carolina is to implement TIC within the clinical setting to reduce patient engagement in health-risk behaviors and ultimately decrease the prevalence of infant mortality. Effective implementation of such care will only occur if healthcare professionals perceive ACEs as a real threat and can adopt TIC to help mitigate its effects. Therefore, the HBM will be the most appropriate behavioral change model.

Intervention Strategies

<i>Table 7. Objective Intervention Strategies</i>			
Objective Type	Theory-Construct	Intervention Strategy	Possible Activities
Learning	HBM Perceived Susceptibility Perceived Severity Perceived Benefits	Health Communication Health Education	<ul style="list-style-type: none"> • Hold educational seminars in healthcare system facilities which focus on addressing the frequency and severity of ACEs • Provide resources to healthcare directors about TIC • Attend SCHA networking events to raise awareness
Environmental	HBM Cues to Action Perceived Barriers	Health Policy & Enforcement Health Communication	<ul style="list-style-type: none"> • Perform annual ACE awareness events in healthcare facilities • Disseminate resources throughout facilities (flyers, pamphlets, posters...) • Standardize TIC in facilities • Implement custom practices such as ACE questionnaires and routine trauma screening
Behavioral	HBM Self-Efficacy	Health Education	<ul style="list-style-type: none"> • Implement annual TIC training • Evaluate healthcare professionals on implementation and ACE acknowledgement • Designate evaluator in each facility

Resources

- **Personnel:** Essential personnel include one full-time program manager, one full-time program coordinator, and four certified TIC trainers. The program manager will oversee day-to-day functions and executive decisions. The program coordinator will be responsible for working directly with TIC trainers and preparing educational material. The TIC trainers will be selected based on where they live as each trainer will be assigned a region in South Carolina.
- **Space:** The main office will be located in Columbia, South Carolina as this is the state capital and is conveniently located between regions. Both the program manager and program coordinator will work out of this office and perform day-to-day tasks. Educational seminars will be hosted within the facilities themselves in conference rooms/office spaces.
- **Equipment and Supplies:** Advertising materials will be needed for educational purposes. This includes paper, printers, ink, computers, posters, and other similar supplies.
- **Curriculum:** Educational material which will be presented at the initial seminar and subsequent refresher courses will be created by this program's personnel. The following sources will be used to develop appropriate and accurate material: The National Child Traumatic Stress Network, Children's Trust of South Carolina, and Substance Abuse and Mental Health Services Administration (SAMHSA).
- **Funds:** Funds will be received through grants and donations with a five-year program budget of \$1,473,900.

PART VI - IMPLEMENTATION

Implementation Plan

For this program to begin, appropriate funding and personnel are needed. Grants will be acquired via the SC Hospital Association and March of Dimes. Additional grants will be researched and applied through Grants.gov, an E-Government managed by the Department of Health and Human Services. Interviews will be conducted as our program will require a full-time program manager and full-time coordinator. The program manager will work closely with stakeholder healthcare facilities and set up times and dates of educational seminars. They will also be responsible for finding and hiring the four TIC trainers. These individuals must be certified in their training and have experience in maternal and infant care. They will be responsible for hosting educational seminars, certifying healthcare professionals in TIC, and performing routine evaluations. The program coordinator will be responsible for working directly with TIC trainers by maintaining bi-weekly contact and setting up room and board when travel is necessary. They will also be responsible for preparing educational material (flyers, pamphlets...) and other needed supplies.

An office space in Columbia, South Carolina will be leased at the beginning of the program. Although the program focuses on decreasing preterm birth among non-Hispanic Black women in South Carolina, the program will target its efforts on healthcare professionals who serve these high-risk women. This program's time frame is five years so that there is sufficient time to host educational seminars and implement TIC into actual practice. After change within the clinical setting, it will then take time for behavioral change to occur in the target population and for their engagement in health-risk behaviors to decrease. It will then take time to evaluate reductions in annual rates of preterm birth and infant deaths.

Program Timeline

<i>Table 8. Program Timeline – Year 1 (2023)</i>												
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
Research, apply for, and receive grants/funds	X	X										
Hire program director and coordinator			X									
Interview, hire, and train four TIC instructors				X	X							
Search for office building and sign lease			X	X	X							
Develop educational program and its related materials					X	X	X					
Reach out to SCHA and stakeholder healthcare facilities						X	X					
Hold educational seminars in stakeholder facilities								X	X	X	X	X
Train healthcare professionals in TIC								X	X	X	X	X
Evaluate								X	X	X	X	X

Program Marketing Plan

Cues to action will play a major role in this program so that healthcare professionals will be continuously reminded to acknowledge ACEs and implement appropriate TIC. Therefore, dissemination of marketing material within healthcare facilities will be a large focus. The most appropriate framework for implementing effective TIC within the clinical setting is the Empower Action Model (See Appendix E). Developed by the South Carolina ACEs initiative, this model recognizes the relationship among various levels of society and individual protective factors through the course of life, while also addressing implications of race and ethnicity (Srivastav et al., 2019). The center of the model depicts the socio-ecological model of health, which ultimately recognizes that multiple levels influence individual health and work interconnectivity (Srivastav et al., 2019). Surrounding this model are five protective factors which were developed according to similarities among previous frameworks (Srivastav et al., 2019). These factors demonstrate the various actions and behaviors which can be implemented across multiple levels to mitigate the effects of ACEs while also accounting for one's social determinants of health (Srivastav et al., 2019).

This model, which recognizes that ACEs act as the root cause of all disease, provides a framework for addressing adversity in numerous levels of society to combat determined health outcomes among respective populations (Srivastav et al., 2019). In this program, the model will thus serve as the framework for healthcare professionals in building protective factors among non-Hispanic Black women to address negative maternal and infant health outcomes (See Appendix E). This is the framework which will act as the foundation for implementation of TIC and standardized practice across all facilities and will therefore be posted throughout all

stakeholder facilities. Additional marketing materials which will be placed throughout facilities will include infographics addressing ACEs and TIC (See Appendix E).

Program Budget

Table 10. YEAR 1 BUDGET FORM	
Category (per year)	Cost (per year)
<u>Salaries and Wages</u>	
Program Manager (full-time)	\$55,000
Program Coordinator (full-time)	\$40,000
TIC Trainer (4)	\$160,000
<u>Equipment</u>	
Laptop (6)	\$4,200
Printer (2)	\$700
<u>Supplies and materials</u>	
Internet	\$2,000
Educational materials (flyers, posters pamphlets)	\$1,500
Paper	\$150
Ink	\$150
<u>Travel</u>	
Mileage	\$1,000
Room and Board	\$10,000
<u>Services</u>	
Office Space	\$15,000
Utilities	\$8,000
Phone	\$1,000
Year 1 Cost	\$298,700

Table 11. YEARS 2-5 BUDGET FORM	
Category (per year)	Cost (per year)
<u>Salaries and Wages</u> Program Manager (full-time) Program Coordinator (full-time) TIC Trainer (4)	 \$55,000 \$40,000 \$160,000
<u>Supplies and materials</u> Internet Educational materials (flyers, posters pamphlets) Paper Ink	 \$2,000 \$1,500 \$150 \$150
<u>Travel</u> Mileage Room and Board	 \$1,000 \$10,000
<u>Services</u> Office Space Utilities Phone	 \$15,000 \$8,000 \$1,000
Years 2-5 Cost (Per Year)	\$293,800
Total Five-Year Cost	\$1,473,900

PART VII - PROCESS, IMPACT, AND OUTCOME EVALUATION

Table 12. Program Objectives Evaluation

Objective/Level of Evaluation	Key Indicator (measure)	Data Collection
<p><u>PROCESS</u></p> <p><i>1. By January 1st, 2024, program staff will have hosted at least one ACEs educational seminar in all 37 healthcare system stakeholder facilities.</i></p> <p><i>2. By January 1st, 2024, all 37 healthcare system stakeholder facilities will receive proper TIC training.</i></p> <p><i>3. By January 1st, 2024, program staff will have designated one individual as the TIC evaluation director for each of the five healthcare systems stakeholders.</i></p>	<p>1. Hosted ACE seminar at all stakeholder facilities, a total of 37</p> <p>2. All 37 facilities have received proper TIC training</p> <p>3. One TIC evaluator has been designated among each of the five stakeholder healthcare systems</p>	<p>Formative</p> <p>1. List of dates and times of seminars, including facility director signatures</p> <p>2. Certifications for each facility, signed and dated by trainer and director</p> <p>3. Evaluation contracts signed by designated evaluator</p>

<p><u>IMPACT (LEARNING)</u></p> <p><i>1. Upon completion of educational seminars, 80% of healthcare professionals will be able to list at least five examples of the association between PTB and ACEs.</i></p> <p><i>2. Upon completion of training, at least 80% of healthcare professionals will be able to list the six principles of TIC.</i></p> <p><i>3. Upon completion of training, at least 80% of healthcare professionals will be able to describe the four approaches to TIC.</i></p>	<p>1. 80% of the healthcare professionals can list at least five examples of the association between ACEs and PTB</p> <p>2. 80% of the healthcare professionals can list the six principles of TIC</p> <p>3. 80% of healthcare professionals can describe the four approaches of TIC</p>	<p>Summative</p> <p>1. Pre/post test</p> <p>2. Pre/post test</p> <p>3. Pre/post test</p>
<p><u>IMPACT (BEHAVIORAL)</u></p> <p><i>1. Six months after the educational seminars, 80% of healthcare professionals will report incorporating ACEs into patient diagnosis and treatment plans.</i></p> <p><i>2. Three months after training, 90% of the healthcare providers will report implementing TIC among high-risk patients</i></p>	<p>1. 80% of healthcare professionals will report incorporating ACEs into patient diagnosis and treatment plans</p> <p>2. 90% of healthcare professionals will report implementing TIC among high-risk patients</p>	<p>Summative</p> <p>1. A six-month follow-up survey sent out to all healthcare professionals via work email</p> <p>2. A three-month follow-up survey sent out to all healthcare professionals via work email</p>

<u>OUTCOME</u>		Summative
<p><i>1. From January 2023 to December 2027, prevalence of PTB among non-Hispanic Black women in South Carolina will decrease 5% from baseline according to data presented by SCDHEC Vital Statistics.</i></p> <p><i>2. From January 2023 to December 2027, IMR among non-Hispanic Black women in South Carolina will decrease 5% from baseline according to data presented by SCDHEC Vital Statistics.</i></p>	<p>1. Percent of preterm births among non-Hispanic Black women will decrease 5%</p> <p>2. IMR among non-Hispanic Black women will be 10.64</p>	<p>1. SCDHEC Vital Statistics data</p> <p>2. SCDHEC Vital Statistics data</p>

CONCLUSION

Infant mortality is complex issue which is influenced by a plethora of factors. Thus, is not just a reflection of maternal and infant health, but a prominent indicator of community health. While IMR have decreased in the United States within the last few years, these reductions are statistically insignificant and remain substantially higher than other developed countries. Worldwide, nationwide, and statewide deviations in IMR, indicate health disparities and the need for further assessment and intervention strategy development. The evidence-based PRECEDE-PROCEED model is an evidence-based health promotion planning model which has been used for a variety of public health programs as it facilitates the identification of appropriate disease-causing factors and program objectives and provides a framework for effective implementation and evaluation.

Using a modified PRECEDE-PROCEED planning model, an IMR clinical intervention program was designed. The PRECEDE component of this model included analyzing the various behavioral, environmental, and physiological factors which contribute to infant mortality among non-Hispanic black women of childbearing age in South Carolina and identifying healthcare professional recognition of ACEs and subsequent treatment plans as the program focus. The PROCEED component of this model utilized the Health Belief Model to design the health promotion plan Empowered Mothers of South Carolina. This program's purpose is to decrease PTB among non-Hispanic black women in South Carolina by increasing ACE acknowledgement and TIC implementation in the clinical setting.

As an aspiring women's health physician assistant who plans to work in South Carolina, my thesis topic was extremely important to me, and I will use this newfound knowledge in all future patient interactions.

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APPENDIX A

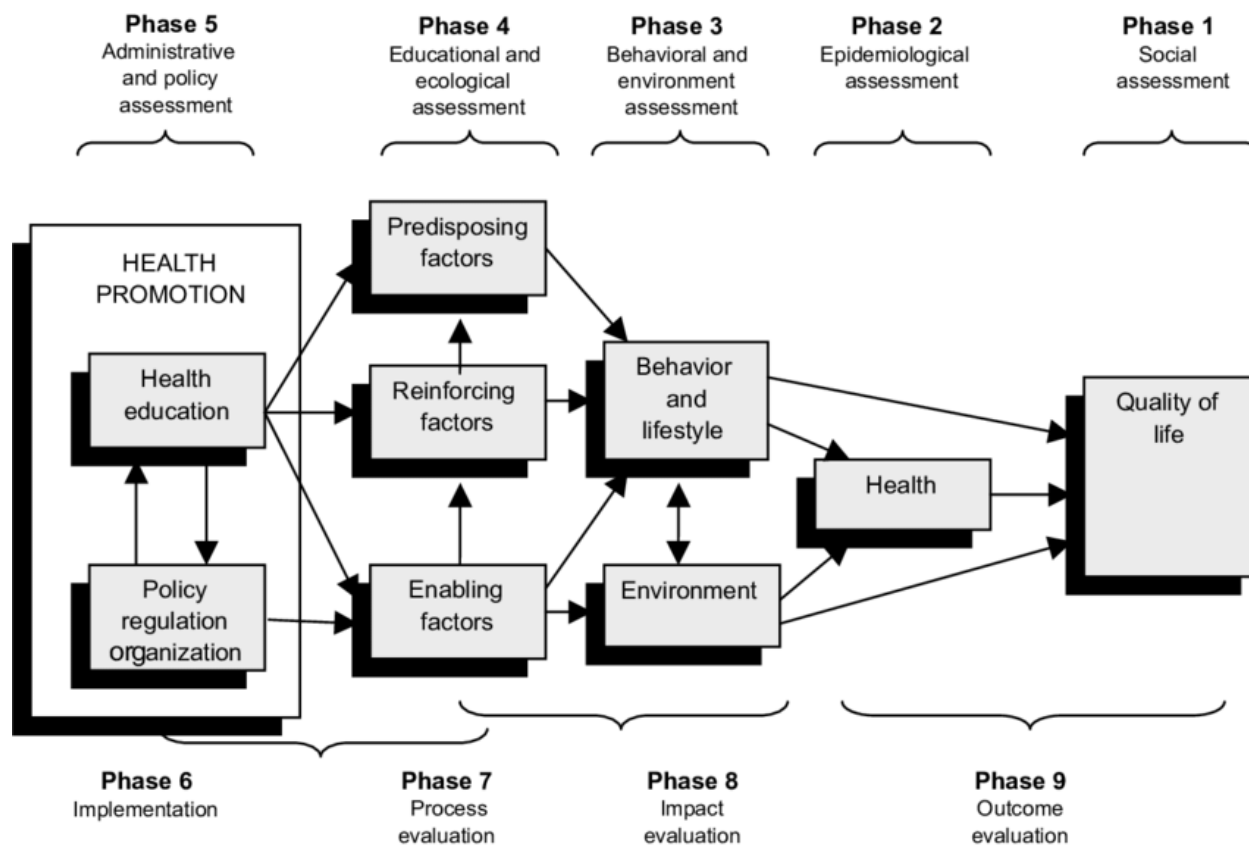


Figure A1. PRECEDE-PROCEDE Planning Model Framework (Classen, 2007)

APPENDIX B

South Carolina Infant Death, Resident Data, 2017-2019, White

Rank	Cause of death	Number	Rate
	.....All White Infant Deaths.....	529	4.7
1	Congenital malformations, deformations, etc. (Q00-Q99).....	125	1.1
2	Disorders related to short gestation and low birthweight (P07).....	63	0.6
3	Accidents (V01-X59,Y85-Y86).....	51	0.5
4	Sudden infant death syndrome (R95).....	26	0.2
5	Fetus and newborn affected by maternal complications of pregnancy (P01)...	21	0.2
6	Newborn affected by complications of placenta, etc. (P02).....	15	0.1
7	Intrauterine hypoxia and birth asphyxia (P20-P21).....	15	0.1
8	Bacterial sepsis of newborn (P36).....	14	0.1
9	Neonatal Hemorrhage (P50 - P52, P54).....	13	0.1
10	DZ of Circulatory System (I00 - I99).....	12	0.1
	.....All Other Causes.....	174	1.5

South Carolina Infant Death, Resident Data, 2017-2019, Black and Other

Rank	Cause of death	Number	Rate
	.....All Black And Other Infant Deaths.....	638	11.0
1	Disorders related to short gestation and low birthweight (P07).....	115	2.0
2	Congenital malformations, deformations, etc. (Q00-Q99).....	84	1.4
3	Fetus and newborn affected by maternal complications of pregnancy (P01)...	69	1.2
4	Accidents (V01-X59,Y85-Y86).....	53	0.9
5	Sudden infant death syndrome (R95).....	35	0.6
6	Bacterial sepsis of newborn (P36).....	24	0.4
7	Newborn affected by complications of placenta, etc. (P02).....	17	0.3
8	Respiratory distress of newborn (P22).....	13	0.2
9	Influenza and Pneumonia (J10 - J18).....	11	0.2
10	Intrauterine hypoxia and birth asphyxia (P20-P21)	11	0.2
	.....All Other Causes.....	203	3.5

¹Rates per 1,000 live births. Rates calculated with 20 or fewer deaths are unreliable and should be used cautiously.

Figure B1. South Carolina Causes of Infant Deaths 2017-2019 (SCDHEC, 2020)

APPENDIX C

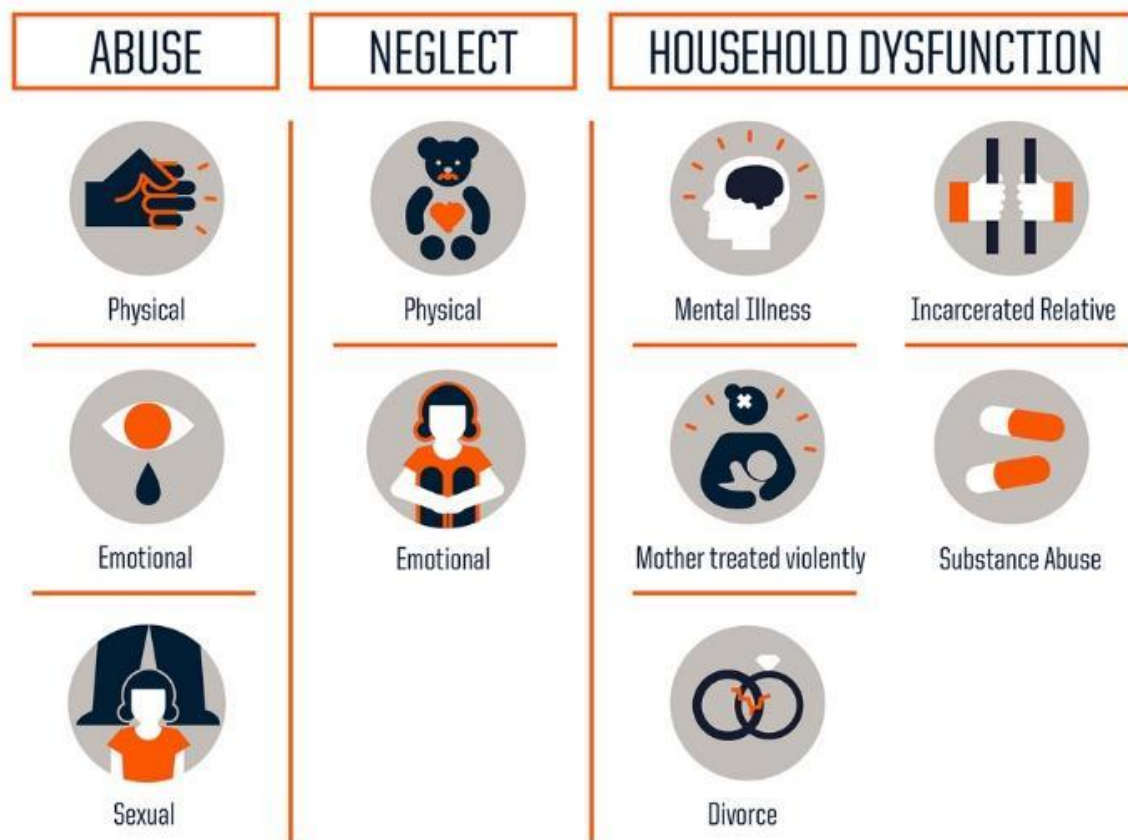


Figure C1. Categories and Subcategories of ACEs (Robert Wood Johnson Foundation, n.d.)

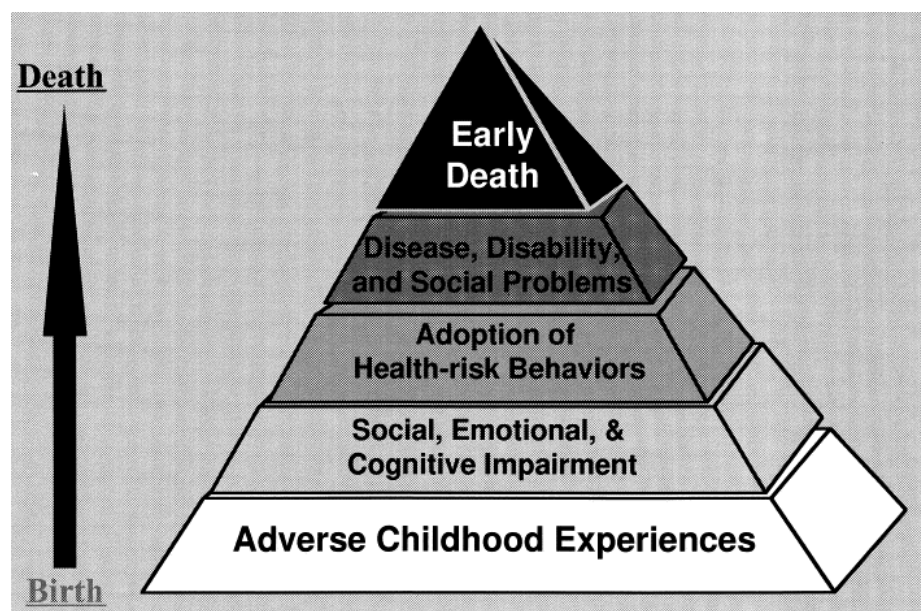
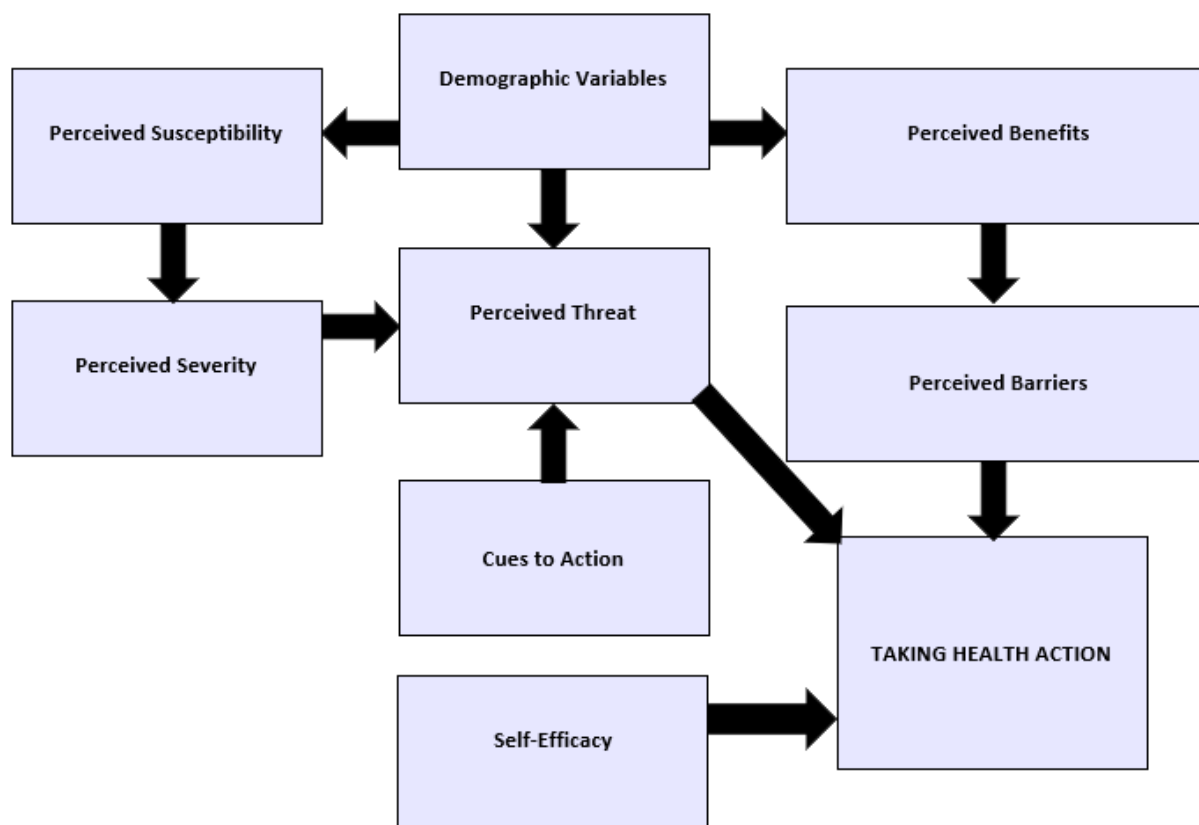


Figure C2. ACE Pyramid ((Felitti et al., 1998)

APPENDIX D

*Figure D1. Health Belief Model Framework*

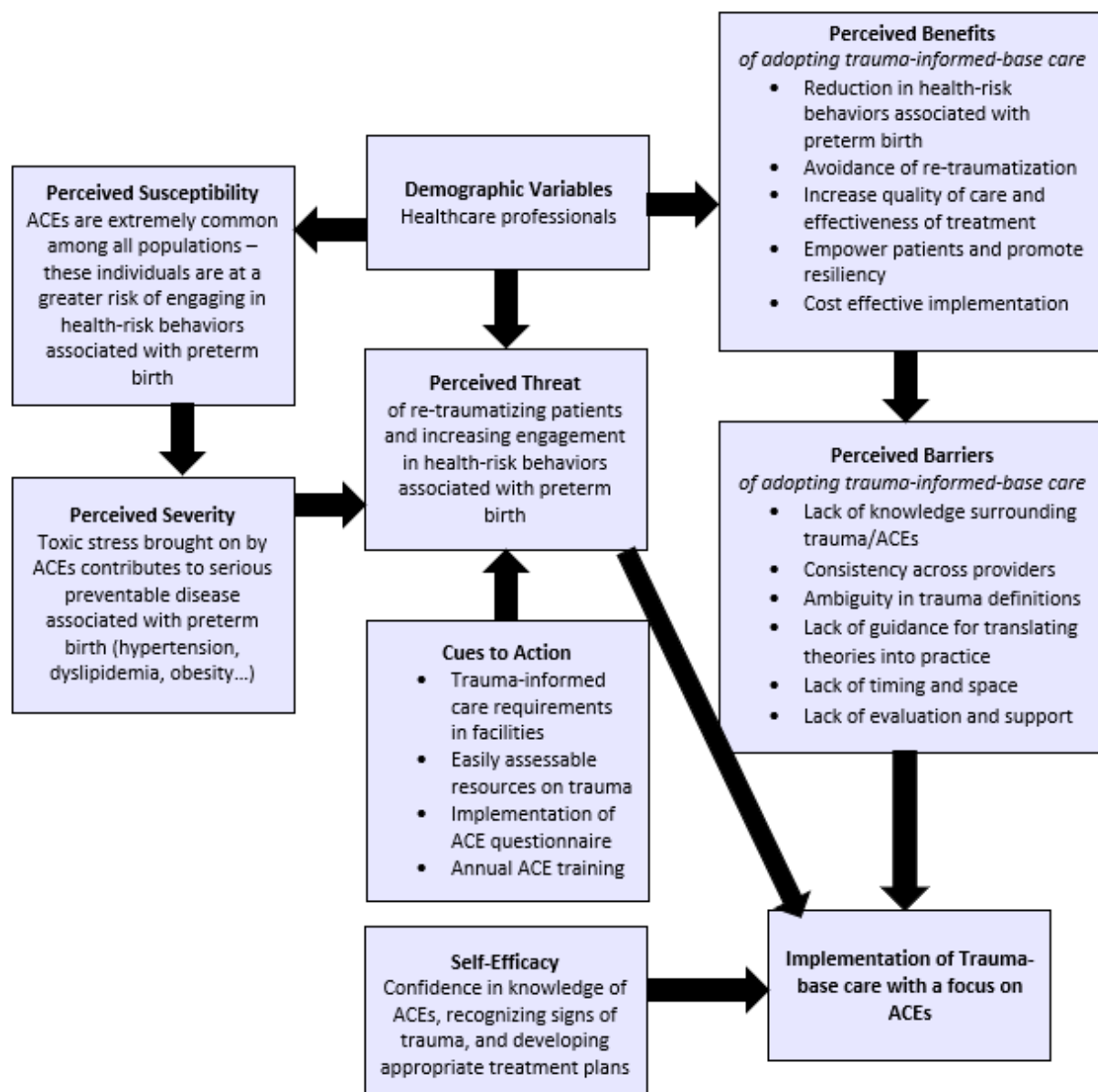


Figure D2. Health Belief Model TIC Implementation

APPENDIX E

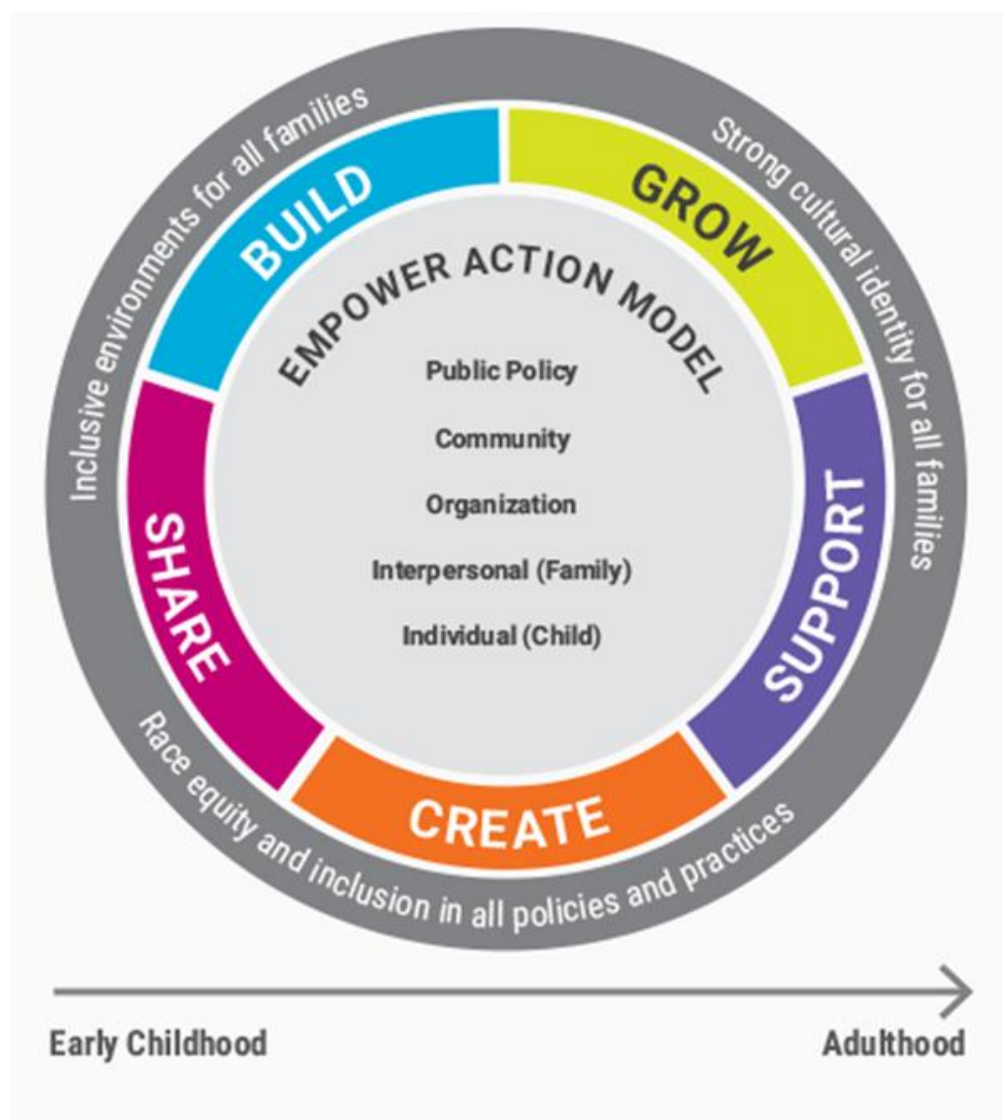


Figure E1. Empower Action Model Framework (Srivastav et al., 2019)



Figure E2. Empower Action Model TIC Implementation



Figure E3. TIC Principles (Training and Treatment Innovations, n.d)

The Four Rs of Trauma-Informed Care



This figure is adapted from: Substance Abuse and Mental Health Services Administration. (2014). SAMHSA's concept of trauma and Guidance for a trauma-informed approach. HHS publication no. (SMA) 14-4884. Rockville, MD: Substance Abuse and Mental Health Services Administration.

Figure E4. TIC Approaches

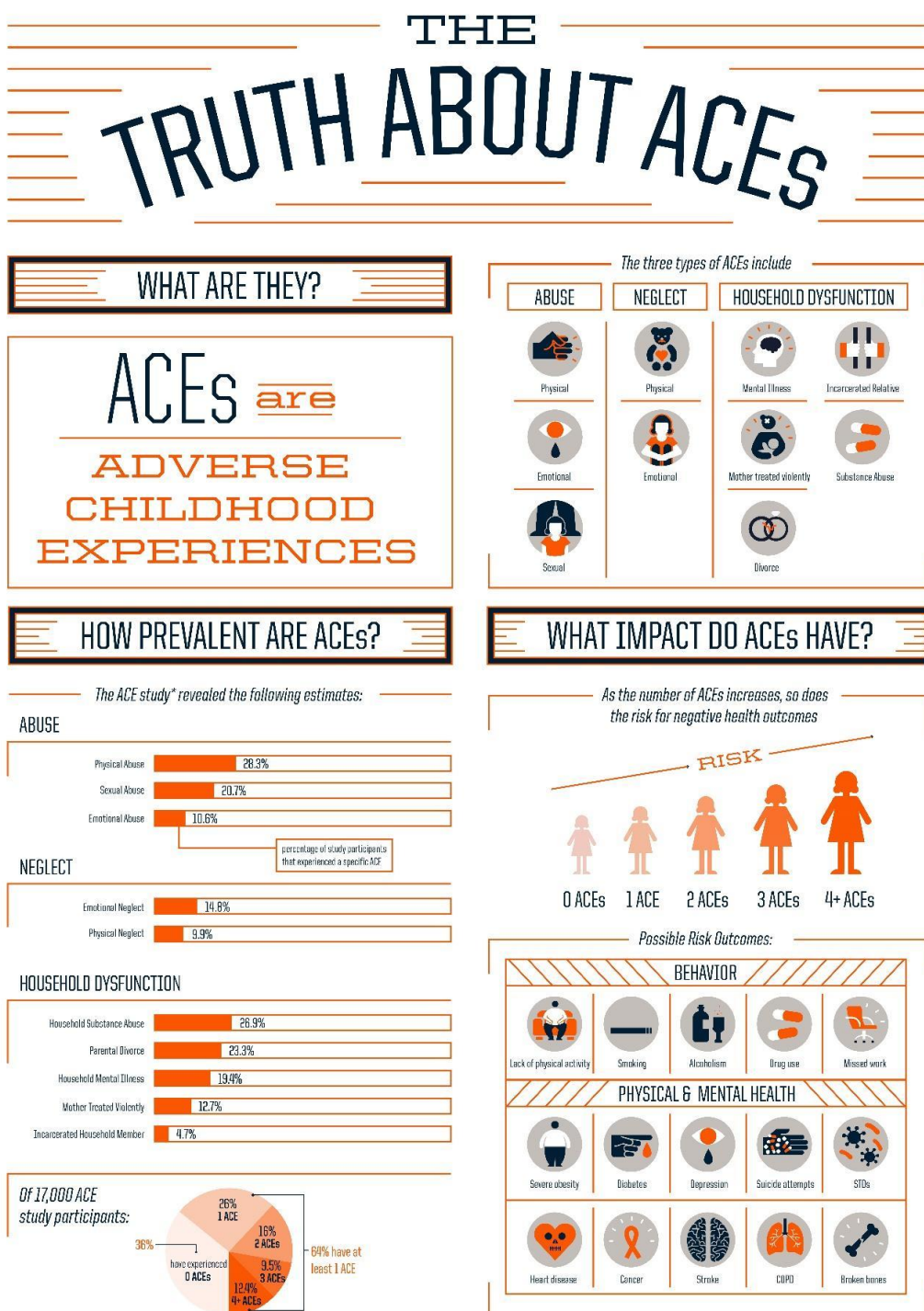


Figure E5. ACEs Infographic