

University of Vermont

ScholarWorks @ UVM

UVM Honors College Senior Theses

Undergraduate Theses

2019

An Exploration of Demographic Risk as a Barrier to Engagement in Perinatal Wellness

XiXi Halvorson-Phelan
The University of Vermont

Follow this and additional works at: <https://scholarworks.uvm.edu/hcoltheses>

Recommended Citation

Halvorson-Phelan, XiXi, "An Exploration of Demographic Risk as a Barrier to Engagement in Perinatal Wellness" (2019). *UVM Honors College Senior Theses*. 307.
<https://scholarworks.uvm.edu/hcoltheses/307>

This Honors College Thesis is brought to you for free and open access by the Undergraduate Theses at ScholarWorks @ UVM. It has been accepted for inclusion in UVM Honors College Senior Theses by an authorized administrator of ScholarWorks @ UVM. For more information, please contact donna.omalley@uvm.edu.

An Exploration of Demographic Risk as a Barrier to Engagement in
Perinatal Wellness

By XiXi Halvorson-Phelan

University of Vermont Honors College

PhD, Ellen McGinnis, Advisor

PhD, Sayamwong Hammack, Advisor

Honors thesis submitted in partial fulfillment of the requirements for the University of Vermont
Honors College.

ABSTRACT

The perinatal period is an excellent time to target for wellness interventions as women are more likely to interact with their physicians, are exposed to more screenings and often have increased motivation. Women who have certain unmodifiable risks however, are more likely to drop out or not engage in wellness interventions at all, even though they may be the ones who would benefit the most. This study examines the barriers to engagement between women with Medicaid (N=30) insurance versus Private (N = 60) insurance in a unique, evidence-based perinatal wellness intervention called the Vermont Family Based Approach (VFBA). Medicaid women had significantly less education, more adverse childhood experiences (ACES). They also had poorer nutrition. The results showed clear disparities in engagement due to financial barriers, logistical barriers and cultural/social barriers. It was concluded that poverty, and the interrelated risk factors that accompany poverty must be explored and attended prior to health promotion intervention disseminations in the future.

The perinatal period is an excellent time to target for wellness interventions. Women usually have more frequent and consistent appointments with their physicians, allowing for additional opportunities for surveillance, screening, intervention and education (Muzik & Borovska, 2010). When women discover they are pregnant, they often become more aware of their health care practices and demonstrate increased motivation to make positive changes. For example, despite cigarette smoking being highly addictive, many women become “spontaneous quitters” who quit as soon as they realize they are pregnant (DiClemente, Dolan-Mullen, & Windsor, 2000). Their motivation for quitting is centered around the protection of the health and welfare of their babies, and secondarily for themselves. This increased motivation to engage in healthy behaviors is widespread and not isolated to smoking cessation (Edvardsson et al., 2011). Therefore, pregnancy may be a critical time to target for health promotion.

While the perinatal period is a critical time to target for interventions due to higher motivations to pursue healthy habits, it is also an excellent opportunity to address women’s risk of perinatal mood and anxiety disorders (PMADS). Mood and anxiety disorders are more prevalent during the perinatal period than other times in life as hormonal changes, sleep disturbances, and environmental stressors are heightened (J. J. Hudziak, 2008). PMADS not only negatively affect the health of the expecting mother, but also on her labor and delivery as well as the growing child (Human Subjects Research Protocol, Sarah Guth). For example, perinatal depression has negative medical and psychological outcomes for the mother and child (Muzik & Borovska, 2010). Mothers who suffer depressive symptoms are at a greater risk for low-birth weight infants, which is the leading risk factor for death in the first year of life and for life-long health problems (“What are some factors that make a pregnancy high risk?,” 2018).

Therefore, interventions during the perinatal period provide opportunity to focus on wellness promotion during a critically important window of mental health risk, at a time when motivation is highest.

Wellness is essential for all women who are pregnant considering the high motivation and critical need. Despite this, women face both unmodifiable (demographic and lifetime) and modifiable (state-related) risk factors that may act as barriers to engaging in wellness practices in pregnancy. For instance, women born into poverty are more likely to drop out of intervention studies (Grote, Zuckoff, Swartz, Bledsoe, & Geibel, 2007), as are women in a current episode of depression (Muzik & Borovska, 2010). It seems that women with the most risk, who are most in need of health promotion offerings are the least able to access them due to overburdened life circumstances, presenting challenges with retention. Herein, I review common unmodifiable and modifiable perinatal risk factors indicating increased need and decreased ability to engage in wellness.

Unmodifiable Factors (Demographic Risks)

Age. The women's age at the time of pregnancy can impact the mother's wellness and therefore the success of the pregnancy and birth. Research shows that a pregnancy at a young age has an increased risk for complications. Teenagers who are pregnant have an increased chance of developing pregnancy-related high blood pressure, anemia and experience preterm labor and delivery than older women. They are also more likely to avoid getting prenatal care or keeping appointments ("What are some factors that make a pregnancy high risk?", 2018). The increased complications during pregnancy for the women are not only dangerous for the mother but also the infant. Infants born very preterm face many challenges. Their brains and organs are not fully developed so many medical treatments are required after birth to keep them alive such

as machine-assisted breathing. These treatments can cause immense amounts of pain and stress for the infants. This has been linked with long-term negative health consequences such as increased stress and anxiety in childhood as well as depression. MRI's have revealed patterns of lack of coordination in preterm children's brains and slower brain waves ("The long-lasting effects of preterm birth", 2012).

While pregnancy at a young age is associated with higher risk, older pregnant women also have risks. Women over the age of 35 were more likely to experience complications during pregnancy and delivery. They are also found to have a disproportionately high rate of deliveries by Caesarean. The complications can include excessive bleeding during labor, prolonged labor that lasts more than 20 hours and labors that do not advance to the next stage, called a dysfunctional labor. Older women who are pregnant are also more likely to have diabetes and hypertension ("Older mothers more likely than younger mothers to deliver by caesarean," 2007). Many of these factors contribute to a several-fold increase in maternal mortality rate for older mothers versus younger mothers. This can lead to an increased risk of fetal demise, low birth weights and developmental problems such as chromosome abnormalities (Hansen, 1986) (Cavazos-Rehg et al. 2015).

Race. Race is another factor that can be associated with risks for pregnant women. It is associated with a crescendo of other negative factors that can influence the wellness of the women including, but not limited to, lower socioeconomic status (SES), neighborhoods with higher rates of violence, and lower levels of education ("Ethnic and Racial Minorities & Socioeconomic Status," 2019) (Williams, Priest, & Anderson, 2016). These variables have an impact on the mother's psychological and physical wellbeing.

Racism is heavily prevalent in society, leading to profound disparities in birth outcomes. It is particularly persistent in the African-American population. The overall infant mortality rate in the US is 5.96/1000 live births. In comparison, the overall infant mortality rate for African-Americans is almost double that at 11.11 infant deaths per 1000 live births (Alhusen, Ayres, & DePriest, 2016). What accounts for these disparities is largely unknown, but recently researchers have examined the effects of the duration of chronic stress that minority women experience in a lifetime. This prolonged exposure to chronic stressors may increase the risk for complications and poorer pregnancy outcomes.

African American women are more likely to experience exposure to racial discrimination and experience chronic stress and distress associated with the discrimination. Associated with the discrimination are disparities with respect to resources, such as access to quality of education, safe housing, employment, health care, etc. (Alhusen, Bower, Epstein, & Sharps, 2016). Many women experience racism directly as well as institutionalized/systemic racism. Many participants in a qualitative study that examined African-American women's prenatal care experiences noted that they heard racial slurs directed at them as well as more subtle forms. One woman was unjustly asked by her midwife if she does crack because she was African American (Salm Ward, Mazul, Ngui, Bridgewater, & Harley, 2013). The increased likelihood that African-American's are exposed to racial discrimination and experience chronic stress appears to be related to higher levels of psychological distress (Giurgescu, Zenk, Engeland, Garfield, & Templin, 2017), which can result in worse health outcomes.

Education and Occupation. There is substantial evidence that shows a link between the higher socially and economically advantaged people are, the better their health (Karlsen et al., 2011). The level of education has been shown to have a profound effect on the outcome of the

mother's pregnancy, largely due to their usage of the health services. Results from a global analysis showed a significant relationship between maternal death and the levels of female literacy and schooling (Tuncalp et al., 2014). A recent study led by the World Health Organization conducted an analysis that demonstrated women with no education have about 2.7 times more risk for maternal mortality than women with more than 12 years of education (Tuncalp et al., 2014).

There is significant evidence that relates the level of education an individual has obtained and poverty. The Census Bureau reported that within the population of people who are at or below the poverty level, 29% of that population were people with no high school diploma. A clear decline was also reported where individuals with a bachelor's degree or higher encompassed the smallest percent of the impoverished population ("How does level of education relate to poverty?," 2014). In a separate study, it was suggested that the greater level of education parents obtained, the more likely they were to raise their incomes. It was found that 82% of children who came from low-income families had parents who had less than a high school diploma and no college education. Even with full-time employment, having a low-level of education, families are not protected from low earnings (Douglas-Hall & Chau, 2007).

Most of the highest paid occupations require the most amount of school. For example, physicians and surgeons are some of the highest paid professions but they are required to obtain a Bachelor's degree from a four-year college, then attend medical school for another four years and lastly, they must go through another few years of residency. Georgetown University Center on Education and the Workforce confirms that data is clear: "college is key to economic opportunity" (Carnevale, Rose, & Cheah, 2007). A Census Bureau study estimated that an individual with a Bachelor's degree earned 75% more than that earned by high school graduates.

While education is certainly associated with a significant increase in income, disparities still exist depending on age, gender, race/ethnicity. Within these findings and despite holding the same degree, women earn less at all levels. On average, women earn 25% less than their male counterparts while they hold the same degree. Even more striking is that African Americans and Latinos who hold Master's degrees earn less in a lifetime than Whites with a Bachelor's degree (Carnevale et al., 2007). The data from this study demonstrates that more education pays off and demonstrates how other unmodifiable life factors can influence risk. The gap in earnings between those who go to college and obtain a degree compared to those who do not is growing at an alarming rate. Higher education opens the doors for higher-paying jobs which ultimately results in higher SES.

Hollingshead-Four Factor Index. The Hollingshead Four Factor Index is an algorithm that considers the relationship between education and occupation to create a value that indicates the SES of an individual and of a family. It is frequently used to measure SES and has high validity in multiple studies as a valuable predictor (Cirino et al., 2002). The four factors in the Hollingshead Four Factor Index include education, occupation, sex and marital status. Level of education is a valid predictor for the higher paying occupations as education is a prerequisite for many professions (Hollingshead, 1975).

Occupation also varies in the earlier years of adult life, but it generally stabilizes over the years. Occupation is a strong indicator of SES and represents the skills and power an individual possesses to function in society. While the sex of an individual usually remains constant throughout life, in regards to career and pay, it plays a very influential role in society. The marital status of an individual is also significant not only due to single versus dual income in a household but additionally because everyone participates in the economic system in different

ways. One person may work full-time while the other brings in no income as a stay-at-home parent (Hollingshead, 1975).

Previous studies have demonstrated that low SES is associated with adverse outcomes such as premature birth, low birthweight and infant mortality. Some external factors that have been cited as potential explanations for these increased risks are due to poor nutrition and lack of access to health care. An additional physiological explanation is due to the HPA axis. Low SES might be an indication of chronic stressors, which can cause wear and tear on the HPA axis, resulting in abnormal production of cortisol and increased risk for adverse outcomes during pregnancy (Bublitz, Vergara-Lopez, Treter, & Stroud, 2016).

Adverse Childhood Events (ACES) and Life Stressors. ACES include childhood abuse, neglect and household dysfunction such as having a parent use substances or having a family member incarcerated. The more adverse childhood events someone has experienced, the higher the risk for later problems including heart disease and diabetes (“What are aces?,” n.d.). Research has demonstrated that stressful and traumatic experiences in childhood have negative impacts, leading to a lifetime of increased risk for developing behavioral, health and social problems (Brown et al., 2009). Studies have also shown that women who have high ACE scores are more likely to both perpetuate domestic violence and become victims of domestic violence (Udesky, 2018). With an increased risk for problems later in life that appears to be associated with a higher ACE score, this could have implications for women during the perinatal period.

The findings of one study showed that adverse childhood experiences could result in adverse birth outcomes. It further showed that an individual’s health behaviors, if they have experienced any ACES, are implicated in poor maternal health such as depressive symptoms and household food insecurity (Sun et al., 2016).

The number of ACES experienced has high predictive power on future health outcomes. One study cited 50-78% of at-risk populations for adult depression, substance abuse and suicide attempts can be explained by ACES (Muzik et al., 2016). Early trauma and life stressors experienced during childhood has serious implications for increased life stressors. The perinatal period is especially vulnerable for depression, and women who experienced more ACES are at an even greater risk for getting depressed. Women who reported a history of childhood abuse was positively associated with perinatal depression. Perinatal depression and stress has even more serious implications on fetal health outcomes such as fetal functioning and brain development, including future temperament, cognitive delay and mood and anxiety problems (McDonnell & Valentino, 2016).

Cumulative Risk:

Many of these demographic risks mentioned above are interconnected, which increases maternal disadvantage. For example, youths who grow up in a low-income, inner-city neighborhood have a greater risk of practicing risky behaviors including substance use, exhibit violent behavior and sexual intercourse at a younger age. These behaviors tend to continue through adolescence and into adulthood. The demographic makeup of the low-income, inner-city neighborhoods are heavily populated by African-Americans. While African-Americans are a minority within the United States, they are a majority populating these neighborhoods. By this standard, African-Americans might therefore engage in riskier behaviors or experience more violence and therefore endure more trauma. More trauma and riskier behaviors could then result in more complications during pregnancy and birth, and re-start a cycle of disadvantage (Bolland et al., 2007).

The cyclic nature and interconnectedness of these demographic risks fueled the idea that the overall cumulative risk, or rather the number of hits someone experienced during childhood significantly increases the risk (Ackerman, Izard, Schoff, Youngstrom, & Kogos, 1999). Even more specific is that as the number of risk factors accumulate, the child's internalizing and externalizing problems increase (Feng, Shaw, & Silk, 2008). The cumulative risk index is usually calculated by totaling the number of dichotomized risk factors (Sameroff et al., 2004) (Trentacosta et al., 2008). Multiple studies have shown similar results to the ACEs survey, where there was a greater than fourfold increase in differences found between someone who experienced zero risks and another who experienced four or more. The internalizing and externalizing behavior problems were directly related to the number of risks experienced (Blanz et al., 1991).

Many researchers have developed their own cumulative risk index. Some focus on the contextual factors and include variables such as residential instability and police contact. Other approaches have partitioned risk into distal versus proximal factors. Proximal, which is more internal and within the family and distal which are more ecological and environmental factors. Each approach serves different purposes. The formulation of a cumulative risk index consists of rather arbitrary designations for what factors are included, but can be tailored to serve different purposes (Trentacosta et al., 2008).

As explained above, early risks such as income or living in a single-parent household can have significant and negative impacts including decreased maternal responsiveness and increased negativity and control (Klebanov et al., 1994). It is rare that children experience a single, isolated factor. Rather, children experience multiple risks and it can occur all at once. Research has demonstrated that as the number of risk factors increases, the likelihood of less responsive

parenting behaviors and poor socioemotional problems in children increases as well (Popp, Spinrad, & Smith, 2008). The greater number of “hits”/risks experienced in childhood, therefore has significant impact on the future, especially maternal behaviors and outcomes, which is why catching the accumulated risk is essential to wellness.

The demographic risk factors mentioned above are known as non-modifiable risk factors that cannot be changed, nor controlled. However, there are some modifiable risks that can be targeted, especially some prenatal health practices that have been shown to have a long-term influence on both the infant and mother. These are the risks that should be addressed early and before further, more severe consequences can occur. Intervening early, and before problems can become intractable, can save money in the long run, reduce pain and suffering and can overall improve the wellness (UVM MC OB IRB Protocol SG1).

Modifiable Life Factors during the Perinatal Period

Prenatal Mental Health Symptoms and Perceived Stress. Mental health is just as important as physical health, and is particularly important for pregnant women. The perinatal period can be an especially stressful time biologically and environmentally, and women are at heightened risk for anxiety and depression (Muzik & Borovska, 2010). It is important to note that even “modifiable” symptoms are connected to unmodifiable risk factors. For instance, women who are less educated, lower SES, teens or racial minorities are at a 24% increased risk for experiencing mental illness such as PTSD as pregnancy and birth can re-emerge in women with a history of trauma. Perinatal PTSD in turn increases the risk of experiencing ectopic pregnancies, miscarriage, preterm labor and low birth weight (Muzik et al., 2016). Mental health is just as important as physical health, and it is particularly important for pregnant mothers. Research has shown that the infant’s first exposure to their environment in their mother’s body

has health implications that last a lifetime (“Stress hormone spikes in pregnant women with PTSD,” 2017). Perinatal depression is significant world-wide and can have serious impacts on the overall health of the family. Mothers who report poor mental health are also more likely to have reduced physical health as well. This can impact their self-care and therefore influence their care for their infant. Mothers who suffer from perinatal depression have been shown to have low-weight births and preterm deliveries (Muzik & Borovska, 2010). Additionally, mothers with depressive symptoms tend to have infants who have similar physiological characteristics, such as increased levels of cortisol, less dopamine and less serotonin. Fetus exposure to high levels cortisol, linked to chronic stress and released during stressful situations, are linked to negative health outcomes like heart disease, depression and high blood pressure long-term. It is also linked to preterm birth. The infants can suffer as well and demonstrate less activity, attentiveness and more irritability. Children can show a developmental delay as well if they had mothers who suffered perinatal depression (Muzik & Borovska, 2010).

Partner Drug Problem. People in relationships tend to have extremely strong influences on one another’s decisions and behavior. Therefore, if one partner smokes, does drugs and engages in risky behavior, it is likely that the partner will do so as well. One study examined this influence among couples who were pregnant and determined that the smoking behaviors of the partner has significantly predicted the smoking status of the mother during pregnancy and postnatal period (Hemsing et al., 2012) (Xu et al., 2013). In the findings of one study, there was a high correlation between alcohol, tobacco and other drug use, among pregnant and young couples. There was also a high correlation between male partner drug use, particularly during the prenatal period, and the subsequent behavior among young mothers (Desrosiers, Thompson, Divney, Magriples, & Kershaw, 2016).

Results also showed that there are significant gender differences in the stability of drug use from the pre-perinatal time to the perinatal time and then from perinatal to 6 months postnatal. While young mothers tended to reduce or even abstain from use during their pregnancy, results showed that the women would resume the use during the postnatal period. Males, on the other hand, remained consistent with their use during the perinatal period. Having a partner who continues to use drugs and alcohol and make little change in their habits will likely increase the risk that the mother initiates this behavior postnatally (Desrosiers et al., 2015) (Blanco-Muñoz, Torres-Sánchez, & López-Carrillo, 2009).

Partner. Single-parent families have become increasingly more common around the world. Whether it be from divorce, separation or occur between two people who were never married, there may be implications for the family, pregnancy and infant. Interestingly, the proportions of nonmarital births is higher in disadvantaged groups. The proportion of nonmarital birth among the white population is 29% and 11% among the college-educated, it is 75% among African-Americans and 68% among those lacking a high school diploma (Manning et al. 2015). Researchers therefore began to examine whether there was a link between marital status and birth outcomes. In a systematic review and meta-analyses, a group of researchers examined these links and determined that an unmarried status of women is associated with significantly increased risks of low birth weight, preterm birth or small gestational births. The risks were marginally lower if the individual maintained a cohabiting status, but were still higher than for married women (Shah, Zao, & Ali, 2010).

Another study conducted by Kane (2016) examined the specific advantages of marriage in perinatal health outcomes. It was emphasized that marriage is a social “tie” with associations to health advantages for the children, infants and mother. Lower rates of preterm births and low

birth weights are observed among married women compared to single women (Kane, 2017). It has been suggested that the “unmarried status” may be a reflection for other risk factors, reasoning that the combination of factors results in the negative health outcomes. Maternal health behavior may be impacted due to socio-economic conditions, increased stress and a lack of support (Raatikainen et al., 2005).

Multiple hypotheses have been suggested as possibilities for why the disparities occur in health outcomes. One hypothesis is that marriage protects the health because it reduces the occurrence of risky behavior, such as sexually risky behavior, which decreases the chances of obtaining an infection. It also protects the marriage by increases in social support which can help reduce stress (Raatikainen et al., 2005). The conclusion of this study demonstrated the increased risk for complications in the perinatal period among unmarried women compared to married women.

Nutrition. Perinatal nutrition is of utmost importance. What the mother chooses to either consume, or not consume, can have serious consequences for their infants. High blood sugar can cause birth defects, so women who have diabetes are at an increased risk for complications with the birth and pregnancy. Obesity is another serious risk that is related to nutrition. Women who are obese before pregnancy have a greater chance of developing diabetes during their pregnancy, which again, results in difficult births. Maternal obesity can also cause the fetus to be larger as well, and there is a risk that there will be problems with the baby’s heart. Additionally, it is extremely dangerous for women to gain too much weight during their pregnancy (“What are some factors that make a pregnancy high risk?,” 2018). These risks can be reduced with the proper nutrition intake.

Aside from the risks that come from being overweight, nutrition during pregnancy is vital because there are different demands from the body to keep the mother and infant healthy. The mother's diet needs to be able to support her own needs and support the growth of the baby. Pregnancy will change the women's body and they will need more folic acid and iron than a woman who is not pregnant. Lack of folic acid can result in major birth defects, especially neural tube defects. A pregnant woman will also need more iron in their diet to help make more blood to supply oxygen to the baby. A condition called anemia results from a lack of iron and can result in a preterm delivery or a low-birth weight baby ("Nutrition During Pregnancy," 2018). Attending to nutrition during the prenatal time has been associated with a reduced risk of obesity in their offspring, and continues into adulthood.

Sleep. Substantial evidence has demonstrated that enough quality sleep is vital for everyone's wellness. It is particularly important during the perinatal period. Significant changes in sleep occur throughout the pregnancy and postpartum, and these changes can act as a catalyst for future negative physical and mental health outcomes. Common sleep changes in the perinatal period involve symptoms of insomnia, which is difficulty falling asleep or staying asleep, less time sleeping and insufficient sleep which is characterized by the experience of waking up and not feeling refreshed or awakened (Wilkerson & Uhde, 2018).

The physical and hormonal changes that a women experiences during pregnancy plays a large role in the lack of sleep. Pregnancy comes with weight gain and changes in the shape of their body, as well as nausea, frequent need to urinate, fetal movement, etc. This has serious implications because extensive research has demonstrated a positive relationship between poor sleep and maternal depression (Wilkerson & Uhde, 2018). One study showed a relationship between an infant's sleep pattern and the maternal sleep pattern. The infant tended to follow the

maternal circadian rhythms, so infants whose mothers had poor sleep quality also experienced poor sleep quality (Health, 2011).

Aside from poor mental health and increased risk for depression that is associated with lack of enough quality sleep, women's physical wellbeing is at risk. While sleep deprivation is cumulative, this can create chronic sleep deprivation. Chronic sleep deprivation has been shown to have effects on fat and glucose metabolism, inflammatory processes, learning and cognitive functioning, social relationships, mental health and the overall wellbeing. The immune system can also be compromised with reduced sleep. Women who experienced sleep deprivation had higher rates of cesarean birth, had a longer mean duration of labor, and experienced more pain during labor (Chang, Pien, Duntley, & Macones, 2010). Sleep deprivation affects both physical and mental health, and can cause serious problems during birth.

Mindfulness. The mental wellbeing of women during the perinatal period and pregnancy is of utmost importance. Negative wellbeing such as depression or anxiety has been shown to be associated with an increased risk of adverse pregnancy outcomes such as low birth weight and stillbirths. Mindfulness has recently been shown to promote health, reducing tension, fear or anxiety and therefore an excellent method to improve mental wellbeing (Dhillon, Sparkes, & Duarte, 2017).

Mindfulness is described as being extremely present, non judgemental. It involves thinking and paying attention in a particular way. In one pilot study examining the effects of a mindfulness intervention on prenatal stress and mood, women who received the intervention were shown to have significantly reduced anxiety during their third trimester compared to the control women (Vieten & Astin, 2008). Another study identified the effect of mindfulness during pregnancy for psychiatrically at-risk women. Women were offered a 10-week

mindfulness yoga intervention and the results of the study showed that the symptoms of depression were significantly reduced (Muzik, Hamilton, Lisa Rosenblum, Waxler, & Hadi, 2012). These studies demonstrate the effectiveness of mindfulness in reducing stress and anxiety during the perinatal period.

Significance

Wellness is essential for all pregnant women, but as emphasized earlier, it is particularly essential for at-risk women who have the aforementioned demographic risks. While we have separated unmodifiable from modifiable risks, it is important to note their inherent associations. Evidence has shown women who are racially or financially disadvantaged are more likely to experience depression and other mental health problems. While these women would most likely benefit the most from wellness interventions, it has been shown that this population are also the most likely to drop out of the interventions, not seek treatment, or even engage at all, even if health services are available (Grote, Zuckoff, Swartz, Bledsoe, & Geibel, 2007).

Certain barriers might exist that result from this lack of engagement. These might include financial barriers, such as not being able to afford quality insurance, loss of pay from missing work and limited time to take from work or family. Accessibility can also be an issue as they may lack transportation, locations of clinics or clinic hours. In addition, disadvantaged families can be suffering and experiencing so many other stressors that they feel seeking treatment is just one more burden that they cannot afford (Grote et al., 2007). Other barriers include psychological barriers, such as the existence of stigmas surrounding mental health problems and cultural barriers. The cultural barriers may include cultural insensitivity or ignorance from the health provider or it could stem from the familial beliefs surrounding support, mental health and gender roles.

Health Promotion During the Perinatal Period.

As stated above, the perinatal period is an excellent time to introduce wellness interventions. Specific perinatal wellness domains have been cited as particularly beneficial. One of those domains is yoga and the practice of mindfulness. The perinatal period can be extremely stressful. It can be an anxiety-provoking period for some while others are at a risk for experiencing perinatal depression. Both can lead to adverse outcomes for both mother and infant health outcomes. Perinatal yoga and wellness have been recognized as a safe method to reduce depressive and anxiety symptoms. In one study, pregnant women went through an 8-week mindfulness intervention and found that those who received the intervention showed significantly reduced anxiety and stress (Vieten & Astin, 2008). Another study had women participate in group yoga for one hour each day. The results of this study showed that the practice of yoga was safe, improved birth weight and decreased preterm labor (Narendran, Nagarathna, Narendran, Gunasheela, & Nagendra, 2005). In addition, perinatal yoga has also been shown to improve the length and quality of sleep which is essential to a healthy pregnancy and positive outcomes (Beddoe, Lee, Weiss, Powell Kennedy, & Yang, 2010).

Other important perinatal wellness domains include nutrition interventions. Perinatal nutritional deficiencies can contribute to maternal depressive symptoms and increase risk for complications during birth like preterm birth. One study demonstrated the positive impact that increasing calcium intake in women who are at a high risk for preeclampsia and preterm delivery. Along with the physical benefits, good nutrition during pregnancy is important for the emotional wellbeing of the mother as nutrients are vital for brain functioning (Lawrence & Barker, 2009).

Perinatal exercise interventions have also demonstrated success for improved mental and physical wellbeing. In one study, women in the intervention were prescribed moderate-intensity aerobics and resistance exercise for three days a week, each session about 50-55 minutes. The results showed that perinatal exercise interventions successfully prevented gestational weight gain. Another study showed that perinatal exercise interventions significantly improve maternal perception of health (Ruiz et al., 2013).

Parenting interventions have also been cited as successful for improving maternal wellness. A history of ACES in parents have future consequences for both the parents and their parenting skills, all of which have implications for the development of their infant. One study looked at interventions for mothers and fathers who were survivors of childhood sexual abuse and found that the interventions were associated with improvements in maternal mental health, parenting competence, infant attachment security and overall positive improvements in public health (Stephenson et al., 2018).

While these wellness interventions have been shown to be successful in improving maternal wellbeing, the interventions were all prescribed and consisted of 10-12 required session. Many of the studies also experienced high dropout rates or the participants consisted of high functioning, high income white women (J. Hudziak & Ivanova, 2016). As described earlier, high-risk women present challenges with retention to wellness interventions. They are more likely to drop out or not engage in interventions at all.

The Vermont Family Based Approach (VFBA) in the perinatal setting is a unique, tailored evidence-based wellness intervention, that focuses on promotion and preventative measures. This approach prioritizes behavioral and emotional health, as well as focusing on the entire family (Hudziak & Ivanova, 2016). In hopes of increasing sustainable engagement in

health behaviors, instead of prescribing health promotion activities, the VFBA emphasizes patient-directed goals and program offerings, allowing participants to select type and frequency of programs participation. The Perinatal Wellness Study aimed to utilize the VFBA approach in a sample of pregnant women across a range of demographic risk and examine disparities in engagement.

Wellness Offerings. The VFBA uses evidence-based wellness domains to promote wellbeing during the perinatal period, and hopefully create healthy habits that will continue throughout life. One of the resources that is offered through the VFBA is a Family Wellness Coach (FWC). Many families do not receive formal training on how to raise both happy and healthy children. Many of the practices and rules they use are based on personal experiences and the care they received from their own families. The FWC are trained in approaches such as motivational enhancement, family based assessment and health-promoting practices and routines. Additionally, women who indicate they are struggling with mental health problems are also offered to a Focused Family Coach (FFC, a family therapist) and/or a Family Psychiatrist who take into account not only the patient as an individual but their family role and other members of the family. The FFC provides evidence-based psychotherapeutic interventions, helping to assess the emotional and behavioral health and then developing a treatment. The psychotherapeutic treatment uses evidence-based interventions (Hudziak & Ivanova, 2016). The VFBA also offers a series of wellness promotion activities for free. These offerings included private or group yoga classes, nutrition groups, parenting seminars, mindfulness classes, community dinners and perinatal fitness (Hudziak & Ivanova, 2016). Ample evidence exists suggesting that each of these offerings individually mitigates negative perinatal outcomes and improves perinatal wellness. For instance, prenatal nutrition has been linked with a decrease in

obesity of the infant which carries over into adulthood (Navarro, et al., 2016). Exercise has also been associated with increased maternal health and positive fetal outcomes (Artal et al., 2016). Additionally, prenatal yoga and mindfulness have been linked to better birth outcome as well to decrease mental health and reduce anxiety (Jiang et al., 2015) (Babbar et al., 2016). Finally, music therapy and introduction of music therapy has been associated with a decrease in maternal stress and anxiety during pregnancy which can produce better infant health outcomes (Standley et al., 2012) (Corbijn van Willenswaard et al., 2017). The VFBA-OB study targets all pillars at once for perinatal health promotion because of the evidence of success in previous studies.

Sample of Perinatal Women.

Recruitment for this study involved selecting at-risk women who came from a range of socioeconomic backgrounds. Women from the following two risk groups were targeted: Private insurance and Medicaid to examine patient-directed wellness engagement in each group. They were between 12 and 25 weeks gestation and recruited from the University of Vermont obstetrics clinics.

Medicaid was used as a proxy for SES, but the threshold to receive Medicaid varies from state to state. Vermont has a lower threshold of eligibility during pregnancy than most of the other states. While most states threshold is less than 200% of the Federal Poverty Level (FPL), Vermont's is over 200% ("Eligibility," 2019) ("Medicaid's role for women," 2019). This enables more women to receive health care. Since it has been well-established that many unmodifiable life factors are interconnected, the divide regarding risk is often stratified by income. Therefore, because the eligibility criteria for Medicaid is that the income has to be a certain percentage of the FPL, it serves as an excellent proxy for not only SES, but the additional

unmodifiable and modifiable risk factors that are associated with low SES. Greater cumulative risk thus means more barriers, and overall poorer engagement.

Aims and Hypotheses

The overall objective of my thesis is to examine the impact of unmodifiable and modifiable life factors on the engagement of the participants during the perinatal period. By examining the reasons for potential disparities in engagement, I then hope to isolate the specific factors with the intention of formulating methods on how to better engage at-risk women in future wellness interventions by eliminating potential barriers. I aim to focus specifically on affected or high-risk women during this perinatal period and how to increase engagement within that population.

My specific aims are:

Aim 1. In Aim 1, I aim to examine who the participants of the study are by looking at the unmodifiable risks such as ethnicity, etc. and determine if there is a relationship between whether the at-risk women are in the Medicaid group or Private insurance group. I also aim to look at the primary risk factors that could impact the behavioral and emotional health of the mother. This will involve examining ACES, life stressors, and how that manifests into wellness problems.

Hypothesis 1. I hypothesize that women in the Medicaid group will have a greater number of ACES and life stressors, and overall greater cumulative risk. Medicaid women will also have higher scores in the baseline assessments that indicate higher stress and anxiety or mood disorders. The increased experience with adversity during childhood will correlate with an increase in behavioral and emotional problems and practicing unhealthy behaviors during the perinatal period, such as smoking or omitting exercise.

Aim 2. In Aim 2, I aim to determine specifically what factors predict engagement. Factors might include the unmodifiable risks listed above, such as the role of education level or income level.

Hypothesis 2. I hypothesize there will also be a significant disparity among the Private Insurance and Medicaid Insurance groups with their engagement. Evidence of decreased engagement will include a lack of communication between the FFC, less goal setting, and less attendance to the available wellness classes. I hypothesize higher cumulative risk results in less engagement. Lower education level and income level will also be associated with little to no engagement.

Methods

Participant Recruitment

We randomly recruited 93 women between the weeks of 12 and 25 weeks of gestation from the University of Vermont OB Clinic. Thirty-three women were recruited with Medicaid insurance (n=24) (nine of whom were recruited from the UVM Medication Assisted Treatment (MAT) program for suboxone maintenance), and 60 were from the UVM OB Clinic who had private insurance. All women were offered gift vouchers in exchange for completing questionnaires at baseline and at four-months postpartum. The two types of insurance were used as a proxy for SES. We were interested in these groups so we could examine the effects of poverty on the feasibility of engagement in the health promotion intervention Vermont Family Based Approach (VFBA). Poverty is known to limit a women's ability to both utilize and benefit from wellness interventions.

Procedure

The front desk and/or the Family Wellness Coach (FWC) attached research study flyers to the charts of eligible women who are patients at the UVM OB Clinic. The providers asked their patients as well if they were interested in participating in the study. If patients were interested their information was given to the FWC who contacted the patient directly to arrange a consent meeting.

During the first visit, the subjects were given a full description of both the FWC program and the randomization process. We used an online coin flipper to assign the subjects into either the control or the intervention group as they are recruited into the study according to risk group. If the participant signed the consent to participate, they were either randomized to the control group (Assessment Only) or the experimental group (access to the perinatal wellness intervention, VFBA). All participants were offered gift vouchers to compensate for the time completing questionnaires.

In this first visit, the subjects completed a baseline questionnaire using confidential online Redcap software. The baseline questionnaire included the Adult Self Report (comprehensive mental health questionnaire), the Perceived Stress Scale (PSS), the Mindful Awareness Scale (MAAS), the MOS 36Q (a general health measure), the Yale Vermont Adversity Checklist, the Dyadic Adjustment Scale (measure of partner support) and the Wellness Domain Inventory.

After the completion of the first visit, the FWC reviewed the data with the Family Based Psychiatrists (FFP) and Focused Family Coach (FFC) to create a health promotion and illness-preventing family wellness plan. If the individual was determined to have any focused mental health needs, determined by the questionnaires (either through self-report or if their scores

surpassed clinical thresholds on the adult self-report), the FWC recommended referral to FFC and/or FFP.

During the second visit (one to two weeks later), the VFBA subjects were given feedback based on their responses to the questionnaires. This included areas of both strengths and areas that could benefit from support, per their wellness plan. The FWC and subject collaborated to set goals around the basic wellness domains. Each VFBA subject was also given Fitbit activity trackers to help encourage goals. The FWC presented the wellness plan and once it was established, the following wellness interventions were offered:

- Individual and group mindfulness sessions
- Individual and group yoga sessions
- Bi-weekly individual meetings with FWC to check in on goals and download fitbit information
- Pregnancy nutrition classes: Cooking and eating for baby
- Pregnancy fitness classes
- Attendance at Principles of Parenting information sessions

Throughout the study, the FWC tracked attendance using UVM Redcap at prenatal visits and when the individual utilized the FWC options. If the women expressed obstacles to their attendance to the offered programs in the intervention, the FWC connected them to the necessary resources such as transportation.

Each subject underwent a postpartum telephone call where they would be asked a few, brief questions about their prenatal experience and confidence in the wellness domains. A final survey was also presented to measure the satisfaction with the program called the Client Satisfaction Inventory, Short Form.

2.1 Emotional and Behavioral Functioning

2.1.1 The Adult Self-Report* (ASR; Achenbach & Rescorla, 2003). The ASR is a self-report questionnaire which assesses the emotional, behavioral, and social problems as well as assesses various aspects of adaptive functioning of individuals who are between the ages of 18 and 59 years old. Factor analyses of the ASR problem items have resulted in a correlated 8-syndrome structure. The ASR scoring involves the use of three substance use scales, six DSM-oriented problem scales and an Internalizing, Externalizing and Total Problems scale. The scales were all normed on a U.S. national household sample and shown to have good psychometric properties.

2.1.1 Perceived Stress Scale* (PSS; Cohen, 1988; Cohen, Kamarck, & Mermelstein, 1983) is a 10 item questionnaire that measures the level of self-rated stress in the last month. The items were designed to assess how unpredictable, uncontrollable, and overloaded respondents find their lives. The PSS has been shown to be both reliable and valid with good internal consistency. A higher score indicates higher stress.

2.1.2 Mindful Attention Awareness Scale* (MAAS; Brown and Ryan 2003)
The MAAS is a 15-item scale that is designed to assess a core characteristic of dispositional mindfulness. This mostly involves open awareness and attention to what is occurring in the present. This scale has shown strong psychometric properties and has been validated in college, community and cancer patient samples. A lower score indicates less mindfulness/awareness.

2.1.3 Edinburgh Postnatal Depression Scale (EPDS; Cox, J.L., Holden, J.M. and Sagovsky, R, 1987). The EPDS is a 10-item scale that is widely used in clinical and research settings to measure symptoms of maternal depression and anxiety during the postpartum period. Possible depression is indicated by a score of 10 or more.

2.2 General Health

2.2.1 The MOS 36-item Short-Form Health Survey* (MOS SF-36; Ware & Sherbourne, 1992; McHorney, Ware & Rascek, 1993; McHorney, Ware, Lu & Sherbourne, 1994) was developed to assess the general health in the Medical Outcomes Study. The health constructs that are assessed with the MOS SF-36 are health-related limitations in physical, social and role activities. It also includes questions about physical pain, general mental health, limitations in roles and activities due to mental health status, and vitality and general health. This survey is widely used and has well-established psychometric properties and validity.

2.2.2 Wellness Questionnaire* Designed specifically for this study, it included questions about sleep, exercise, nutrition, drug and alcohol use, and other medications. Subscales within the questionnaires included the Pittsburgh Sleep Quality Index (PSQI) (Buysse, et al, 1989), the Substance Use Risk Profile-Pregnancy (SURP-P) (Yonkers et al 2010), Evaluation of Physical Exercise During Pregnancy (Nascimento et al. 2015) and a questionnaire about nutrition. The questionnaire also included questions about the individual's participation in mindfulness and yoga.

Hollingshead Four-Factor Index

The Educational factor uses the number of school years that the individual has completed and is scored on a seven-point scale. The amount of school that the individual has completed is scored in the following way:

<u>Level of Completed School Years</u>	<u>Score</u>
Less than seventh grade	1
Junior high school	2
Partial high school	3
High school graduate	4
Partial college or specialized training	5
Standard college or university graduation	6
Graduate professional training	7

c. Occupational Factor

The occupational factor is scored on a nine-step scale that uses relatively general occupational titles.

Occupational Scale

- Score 9: Higher Executives, Proprietors of Large Business, and Major Professionals
- Score 8: Administrators, Lesser Professionals, Proprietors of Medium-Sized Businesses
- Score 7: Smaller Business Owners, Farm Owners, Managers, Minor Professionals
- Score 6: Technicians, Semi Professionals, Small Business Owners
- Score 5: Clerical and Sales Workers, Small Farm and Business Owners
- Score 4: Smaller Business Owners, Skilled Manual Workers, Craftsmen and Tenant Farmers
- Score 3: Machine Operators and Semi-Skilled Workers
- Score 2: Unskilled Workers

Score 1: Farm Laborers/Menial Service Workers

The Hollingshead score of an individual or nuclear family is determined by combining the scores from the four factors: sex, marital status, education and occupation. The score for the individual is calculated by multiplying the score from the occupation factor by five and the scale for the education factor by three. To calculate the score for a nuclear family, it involves determining the education score, occupation score and marital status for the two individuals, adding them together and dividing by two to get a combined score.

The computed scores from the four factors will range from a score of 8 to 66. The higher the score, essentially the higher the assumed SES of either the individual or nuclear family. The following computed scores correspond to the following social class:

<u>Social Class</u>	<u>Computed Scores Range</u>
Major business and professional	66-55
Medium business, minor professional, technical	54-40
Skilled craftsmen, clerical, sales workers	39-30
Machine operators, semiskilled workers	29-20
Unskilled laborers, menial service workers	19-8

Eligibility Exclusion Criteria:

- Women who suffered miscarriages during the study were not contacted for outcome data, but if they were in the intervention group, they were offered to continue participating in the Wellness Services for 6 months' post miscarriage.
- Participants were free to withdraw from the study at any point. If they asked to be withdrawn, we kept the information that was already collected but further contact was ended and they were marked as withdrawn.

- Participants were excluded from the study if they fulfilled the following criteria:
 1. Women whose ability to provide consent or fill out questionnaires were potentially compromised. These women included:
 - a. Women who did not understand or speak English
 - b. Women who had a known intellectual disability
 - c. Youth under the age of 18 were excluded

Adverse Childhood Events (ACES)

The Adverse Childhood Experiences survey is currently the most popular method used for adversity assessment. It consists of ten questions that are used to assess the exposure to a variety of traumatic experiences including abuse, neglect and other household challenges such as a divorce or separation. Each item is scored on a 0 to 1 rating scale, and the final score is a combined tally of type of abuse, neglect, and other adverse experiences associated with a difficult childhood (Holbrook et al., 2017).

Statistical Plan

Descriptive statistics were conducted on all variables included in the tables to report the mean or frequency and standard deviations and compare the Medicaid group and Private insurance group. This was all completed using the statistical software, SPSS.

To compare the differences observed between the groups, if any, an independent samples t-test was done to test the difference between the two means and to determine the significance. This t-test was done for continuous variables such as age.

The cross tabulation was completed to understand the correlation between multiple variables and find patterns or trends. This was used on the categorical data, or data that were separated into different groups such as ethnicity. Regressions were conducted to determine the

causal relationship between the independent and dependent variables, such as the significant modifiable or unmodifiable life factors on total goals, total communication, and total activity attendance.

Results

Demographics Table (Unmodifiable)

Table 1 presents the demographic risks of participants split by insurance group. The results show participants with Private insurance were significantly older, more educated, and have less cumulative risk than those with Medicaid. Women with Medicaid also experienced more total ACES than women with Private insurance (* $p = 0.002$), however, there were no significant difference in the number of other life stressors experienced ($p = 0.205$). Comparing the number of ACES of the participants compared to the national, the VFBA participants had a higher percentage of individuals who experienced 4 or more ACEs.

Modifiable Wellness Table

Table 2 shows the modifiable risks present during the perinatal period. There was no significant difference between women who had a partner with a drug problem ($p = 0.240$). Between the two risk groups, there was no significant difference in the internalizing scores ($p = 0.349$). This was the same for the externalizing scores ($p = 0.619$). The Mindfulness Attention Awareness Scale scores (MAAS) were not significantly different ($p = 0.324$). A significant difference was found between the groups regarding poorer nutrition, with the participants who have Medicaid having a higher total nutrition score, indicating a less healthy diet (* $p = 0.038$). Participants in the Medicaid group also had a statistically better quality sleep (* $p = 0.001$), but fewer total hours (* $p = 0.006$).

Engagement

Communication

There were no significant differences found between the communication to the Family Focused Coach (FFC) and from the FFC between the two groups ($p = 0.600$) ($p = 0.275$) (see Table 4). However, there was a significant difference between the two groups with the total communication between the FFC and the participants ($*p = 0.000$). The participants with Medicaid had significantly less total communication with the FFC. The types of responses from the participants to the FFC were statistically different. The participants in the Medicaid group responded by text significantly more than the participants who have Private insurance ($*p = 0.033$). This was different from the % response that was through email where the participants in the Private insurance group responded significantly through email than the Medicaid participants ($*p = 0.002$). There were no significant differences between the groups with the % who called to respond to the FFC ($p = 0.905$).

Total Goals

The total number of goals made between the two groups were significantly different. The participants with Private insurance made significantly more goals ($*p = 0.026$) (see Table 4). This was consistent with the following types of goals, where the Private insurance group made more goals. However, none of these yielded statistically significant differences between the groups with the specific types of goals. The activities were split into different domains. The goals made in the Nutrition domain were not significantly different ($p = 0.065$). The goals made in the Fitness domain were significantly different either ($*p = 0.007$), but the goals made in the Mindfulness domain were not significantly difference between the groups ($p = 0.421$). There was a significant difference between the goals made in the Parenting domain where the participants in the Private insurance group made significantly more goals related to parenting

than the Medicaid group (* $p = 0.003$). Regarding the participant's patterns of exercise, there was no difference ($p = 0.656$). There was also no significant difference with the engagement between the two groups ($p = 0.485$).

Activity Attendance

Private insurance women attended activities related to nutrition more than Medicaid women (* $p = 0.065$). This reached trend level significance. They also attended significantly more fitness activities (* $p = 0.007$) and parenting activities (* $p = 0.003$) than the Medicaid women. There was no significant difference in the overall number of activities attended ($p = 0.485$).

Associations of Engagement with Unmodifiable and Modifiable Factors

Total Goals.

Correlations. The following unmodifiable and modifiable factors associated with patient total goals was: Education only. Such that the more education a woman attained, the more wellness goals she made in the intervention (see Table 7).

Regression Model. Education was therefore entered into a regression predicting the total goals for women with Medicaid and women with Private insurance, separately. In the Private insurance model, education was not significant (std $b=0.138$ $p=.477$), and therefore the overall model was not significant ($F(1,28)=.521$, $p=0.477$; $R^2=0.019$). In the Medicaid insurance model, education was significant (std $b=0.517$ $p=.023$), and so was the overall model ($F(1,18)=6.20$, $p=0.023$; $R^2=0.27$).

Total Communication.

Correlations. The following unmodifiable and modifiable factors associated with patient communication with Family Wellness Coach was: poor nutrition (see Table 8).

Regression Model. Poor nutrition was therefore entered into a regression predicting the total communication with Family Wellness Coach for women with Medicaid and women with Private insurance, separately. In the Private insurance model, poor nutrition was not significantly associated with communication (std b= .066, p = 0.718) and therefore the overall model was not significant ($F(1,31)=.133$, $p=0.718$; $R^2=0.004$). In the Medicaid insurance model, poor nutrition was associated with less communication with FWC (std b=-.552, $p=.008$) and the overall model was significant ($F(1,21)=8.79$, $p=.008$; $R^2=.31$).

Total Activity Attendance.

Correlations. The following unmodifiable and modifiable factors associated with patient total wellness activity attendance were: socioeconomic status (Hollingshead), and total childhood traumatic experiences (ACES). The lower the socioeconomic status or the more traumas, the less total attendance (see Table 7).

Notably, all unmodifiable factors were significantly related to at least one subcategory of wellness activities (fitness, parenting and/or self-care, see Table 7). Interestingly, no modifiable factors were correlated with activity attendance.

Regression Model. Socioeconomic status (Hollingshead), and total childhood traumatic experiences (ACES) were therefore entered into regressions predicting to Total Activity Attendance for women with Medicaid and women with Private insurance, separately. In the Private insurance model, only ACES (std b=-.362, $p=.070$) reached trend level significance in association with total activities, such that women with more childhood trauma attended fewer total activities. However the overall model did not reach significance ($F(2,28)=2.09$, $p=.144$; $R^2=.138$). In the Medicaid insurance model, no factors were significantly associated with total

activities and thus the overall model did not reach significance ($F(2,17) = 1.463, p = .263$; $R^2 = .163$).

Discussion

While the perinatal period is an excellent time to target for wellness interventions as women are more likely to interact with their physicians, are exposed to more screenings, and often have increased motivation. Women who have experienced more risks throughout their lifetime and during the perinatal period, are more vulnerable to negative maternal health outcomes. Therefore, perinatal wellness promotion is particularly crucial for women with a history of these unmodifiable risk factors. However, these at-risk women are less likely to engage, have higher dropout rates or not participate in these interventions at all. This is problematic as this at-risk population might be the ones who would benefit most from these interventions.

I examined how both unmodifiable (lifetime demographic) and modifiable (pregnancy/state) risks influenced the engagement of health promoting activities in women during the perinatal period using the Vermont Family Based Approach (VFBA). As a personalized, patient-centered approach to health promotion activities, I compared these associations between women with Medicaid versus Private insurance (a proxy for low and high socioeconomic status). First, I aimed to examine who the participants of the study were by looking at demographics and other unmodifiable risks, such as ethnicity, ACES and life stressors, as well as cumulative risk scores.

Unmodifiable Risks.

The age of the women during the perinatal period was examined (See Table 1). While the women in Medicaid were significantly younger than the women in Private insurance, they

did not fall within the range for risky pregnancies. This significant result could be an indication of less education and therefore lower SES, though, further demonstrating the interconnectedness of these life factors (“How does level of education relate to poverty?,” 2014). Race was another unmodifiable life factor that was examined. Contrary to previous results, this did not reach significance in our subset of women. Both Medicaid and Private groups consisted of more than 75% white women. There were only five minority women in the Medicaid group. Women of minority status have been shown to have significantly more risks associated with their race. Studies have demonstrated that minorities, specifically African Americans, are more likely to be of lower SES, come from neighborhoods with higher rates of violence, and have lower levels of education (Peterson, Krivo, Vélez, & Lyons, n.d.). Additionally, they are more likely to experience chronic stress due to racism, leading to profound disparities in health outcomes. The racial makeup of our participants was not surprising. Vermont has a population of around 624,263 people, as of 2019. 94.7% of the population are white, 1.5% are Asian, 1.2% are African Americans, and 0.3% are Natives of North America (“Vermont Population 2019 (Demographics, Maps, Graphs),” n.d.). Although race did not seem to be a significant contributing factor to the disparities in engagement in our particular study, it could have significant influence on other perinatal wellness interventions if they were in an area that had more diversity and a larger population. Thus, extensive previous evidence has shown that race is a significant factor for maternal health outcomes and should be considered.

The Hollingshead score was a value used to measure SES. It accounted for the level of education and occupation of individuals in a single or double household income. Within the Hollingshead scores, only the education score was significantly different between the women with Medicaid and Private insurance. The results demonstrated that the women in the Medicaid

group had lower levels of education. These results aligned with previous findings that demonstrated greater levels of education are associated with higher SES. One study linked the majority of the population who is at or below the poverty threshold have not graduated from high school (Douglas-Hall & Chau, 2007). Individuals living on low incomes have a higher prevalence of mental health problems than the general populations (Hudziak & Ivanova, 2016), emphasizing the significance of considering SES for health promotion.

While the Education score was shown to be significant, the total Hollingshead score and occupation scores were not. This was not surprising as other studies have questioned the reliability of Hollingshead score due to the algorithm to calculate the final scores. While the Education scoring was very straightforward, leaving little for different raters interpretations, the occupation calculation was extremely arbitrary. For instance, women might be in the process of transitioning jobs, as is common during the perinatal period. Homemakers were regarded as 0 on the scale, but in reality, the family could have a large income from their partner, allowing for the mother to stay at home. Additionally, many jobs were taken from the US Census, but there are occupations that are not listed and the rater has to score them according to their interpretation. This leaves a lot of room for error for the total Hollingshead score and occupation. Education on the other hand was the most reliable and consistent when scoring, and it remained the most significant and strongest predictor.

Our results from the ACES scoring were also as predicted. The women in the Medicaid group experienced significantly more ACES than the women in Private insurance. Extensive research has shown that individuals with higher ACE scores showed diminished health over a course of a lifetime. High ACE scores have also been associated with reports of non-completion of high school, unemployment and living under the poverty line (Brown et al., 2009). Our

results therefore support previous findings. The disparities in occurrences of ACEs in Medicaid women versus Private insurance women also show that the use of insurance as a proxy for SES appears to be accurate.

Additionally, compared to national statistics, the women in our study experienced more than 4 ACEs than women nationally. The experience of more than 4 ACEs is predictive of a future of substance abuse, depression and overall poor health (Metzler, Merrick, Klevens, Ports, & Ford, 2017). The greater occurrence of more than 4 ACEs in our subset of women indicates our subset of women may be more vulnerable to poorer perinatal wellness. It further shows that this wellness intervention could greatly benefit them, improving their physical and mental health.

Modifiable Risks.

While the unmodifiable life factors play a significant role on the future maternal wellness, there are certain factors that can be changed to promote health (See Table 3). One of those factors was nutrition. Our findings supported previous studies that show low SES and less education are related to unhealthy dietary habits, where the women in the Medicaid group had a significantly poorer nutrition than women with Private insurance. The relationship between low SES, less education and unhealthy dietary habits is not fully understood yet (Konttinen, Sarlio-Lähteenkorva, Silventoinen, Männistö, & Haukkala, 2013).

However, it is true that healthy, organic foods tend to be on the pricier side, preventing low-income families from being able to purchase those items. It is also true that highly processed food high in sodium and fat are significantly cheaper. Another important reason lower income individuals have more unhealthy diets is due to neighborhood disparities and their inaccessibility to healthy options. Accessibility and affordability are crucial elements to maintaining a healthy diet, and if both are unattainable, unhealthy practices will be the

inevitable. These individuals will then be at a higher risk of having chronic illnesses and overall poorer physical and mental health (Fofana, 2017).

While these findings did not reach significance, Medicaid women had a greater occurrence of internalizing and externalizing their problems. This indicates poorer mental health. For both the percentage of internalizing and externalizing above 65, which would be indicative of a serious problem behaviors (Rinaldi & Howe, 2012), the cohort number was too low to compare well across groups. Interestingly enough however, the perceived stress was reported to be significant. This means that the women perceived their levels of stress as significantly higher within the Medicaid group, but their corresponding scores were not consistent.

The mindfulness score was another modifiable life factor during the perinatal period that did not reach significance. A higher score is reflective of higher levels of dispositional mindfulness (Black, Sussman, Johnson, & Milam, 2012), but neither risk group had scores that would indicate more mindfulness among the women. It would appear from these results that both groups would benefit from mindfulness training and that it is not a significant driver for predicting engagement.

Contrary to past studies, the women in Medicaid reported better quality sleep than the women in Private insurance, but fewer hours of sleep. This might be due to the fact that the Medicaid women reported exercising more minutes per week because of their jobs. This can take a serious toll on the body. They may also work more than full time to earn more income, which is also mentally and physically exhausting. Additionally, low-income women will most likely lack the resources for childcare or other support to help with daily activities and therefore, at the end of the day, will be more exhausted and report better quality sleep. The association

between low SES and sleep problems has also been well-established from other studies. Extensive research has shown that sleep disturbances or disorders are disproportionately prevalent in minority groups (Kingsbury, Buxton, & Emmons, 2013). African Americans are almost twice as likely to report fewer hours of sleep. Additionally, physical health, anxiety and depression are also related to fewer hours and poorer sleep (Adenekan et al., 2013). The interconnected nature of race, SES, physical health, increased incidences of anxiety and depression, again have a cumulative and compounding influence on the overall wellness. However, our results were inconsistent from previous studies.

Perceived stress was unsurprisingly, found to be significantly higher within the Medicaid group versus the Private insurance group. These results are highly consistent with other studies that show individuals with low SES and racial minority experience greater levels of stress (Brondolo, 2018). The greater levels of stress reported from the Medicaid women could be due to financial reasons or mental health problems. It has also been shown that people with lower incomes have reported more traumatic events in their childhood. As stated before, greater ACES and life stressors can have profound effects on future maternal health. Additional explanations for greater levels of reported stress, although not entirely accurate for our study, is racism. Minorities experience chronic racism which takes a toll on the body and increases the levels of stress (Giurgescu et al., 2017).

Exercise was another modifiable risk that yielded surprising results. Although this did not reach significance, Medicaid women reported more exercise per week than Private insurance women. Other studies have shown a strong, positive relationship between income and physical activity. In one study, explanations for less physical activity in low-income homes were due to barriers such as distance and price of sports facilities, dangerous neighborhoods, lack of parks or

other areas for recreational activities, lack of spare time and money, and a lack of community support (Kim & So, 2014). Our results were therefore inconsistent with previous findings.

Possible explanations could be due to the types of jobs that Medicaid women have. For instance, waitressing requires walking around, constantly standing up and this counts as exercise. Another occupation is farming, which requires constant lifting, walking, etc, and therefore the amount of time exercising per week was high within the Medicaid group.

Total goals.

Within Medicaid, Education was the only significant factor that predicted the total goals (see Table 7). The higher level of education, the more wellness goals the women made during the intervention. Education was not found to be significantly associated to total goals within women who had Private insurance.

Extensive literature has documented the concept of generational poverty. Children who are born into poverty are more likely to be of low SES as adults and have less wealth to pass onto future generations (Cheng, Johnson, & Goodman, 2016). In addition to passing on less wealth, other behaviors and attitudes are passed on, such as a model of ambition. The direction that children take in their future is significantly influenced by their parents and what their parents modeled for them. Children who had college-educated parents were more likely to attend and graduate from college as well, unlike children whose parents highest level of education was high school (“Parents’ education levels affect children’s likelihood to attend college - study,” 2018). When children see their parents living their lives without having gotten a college degree, they may be less motivated to attend college as well. Additionally, students whose parents do not have a college education lack the support system that is often necessary to complete and graduate from college.

This modeling of ambition and the relationship between parents who don't have a college degree resulting in their children not attending college either, could potentially explain why lower levels of education were related to less total goals. For one, if the children did not see their parents making goals and achieving them, they might be less likely to do so. Additionally, as we progress through higher levels of education, even throughout elementary school, we learn and develop the skills of making attainable goals so we can successfully move forward. This comes from experience with assignment deadlines, or future plans post-graduation.

The women with Private insurance were more likely to have experience making goals as the women, on average, had higher levels of education. Additionally, Private insurance women might have better support systems to help encourage the formulation and completion of their goals. Additionally, hope is an extremely powerful thing. Studies suggest that lower SES individuals often view the future as more negative or have lower expectations about the future. They also experience more feelings of helplessness. Those who are led to believe there is either no hope or think failure and low performance is the likely outcome may be less likely to try (Jensen, 2013).

The level of education was a key component in calculating the Hollingshead score. Multiple studies have examined the reliability of the Hollingshead Four-Factor Index. When calculating the occupation portion, a lot was left for interpretation of the rater. Many of the occupations that exist now were not listed as options. Other jobs might generate a lot more revenue than the level it is listed as. For example, waitresses can make a lot of money but they are low on the scale, which can significantly skew the results. Additionally, students or stay-at-home parents are given a score of 0, but students could mean medical students which means eventually they will be making significant income. Stay-at-home parents may be able to do so

because they are wealthy enough that they can afford a single-income. While the calculation of occupation may seem skewed as it is left to the raters interpretation, the education section was straightforward and therefore much more accurate. In other studies, researchers have found that not only was the education part reliable, the level of education of the female of the household was a strong predictor of family health behavior and preventative health behavior. This would support our results and demonstrate that the level of education was a strong predictor for engaging in the wellness intervention (Green, 1970).

Total Communication.

Within Medicaid, poor nutrition was the only factor significantly associated with total communication. Poorer nutrition was associated with less total communication. It was not determined to be significant within the Private insurance model.

As emphasized throughout this paper, all of these modifiable and unmodifiable life factors are interrelated. Extensive studies have described the consequences on future health outcomes when individuals experience adverse events and stressors during childhood, and additionally the impact of certain unmodifiable life factors such as race. Many of those unmodifiable life factors become influencers for future health decisions, such as nutrition. Low-income and disadvantaged, at-risk women are more likely to have unbalanced and unvaried diets (Kontinen et al., 2013). This disparity may occur because of a lack of access to healthy food, inability to afford it, and decisions can also be heavily influenced by societal and social relationships.

Given the interrelated nature of all these factors, poorer nutrition within the Medicaid women and the lack of communication with the FFC may simply demonstrate how poverty and other unmodifiable risk factors influence future health behaviors. Women who have experienced

more ACES and are low-income with lower levels of education may grow up and have poorer nutrition because they cannot access it as easily or afford it. These cumulative factors together then result in the lack of engagement and communication in the wellness interventions.

Total Activity Attendance.

The results of the significant factors that predicted total activity attendance was surprising. Inconsistent with previous studies, within only the Private insurance model were ACES found to have trend level significance related to activity attendance. The more ACES that the women in Private insurance experienced, the less attendance.

In speculating the reasoning behind these findings, one possible explanation is that we chose to divide the women into risk groups based on insurance. While women in Medicaid were more likely to have four or greater than four ACES, women in Private insurance still experienced ACES as well, there were just less occurrences within the population. Societal differences in how adverse childhood experiences and a background of trauma could influence future decisions about health. For instance, since there were fewer women who experienced adversity during their childhood within the Private insurance model, those who had experienced trauma may be more inclined to keep that private and therefore less likely to participate in an intervention.

Multiple studies have demonstrated that 70% to 100% of residents who live in inner-city poverty experience traumas and severe stressors (Kiser, Nurse, Lucksted, & Collins, 2008). According to those statistics, trauma and adversity is the norm in low-income areas, so there will most likely not be a stigma around a traumatic history. This also has severe impacts on the family functioning. Many families who experience adversity may react with disorganization and instability and this will prevent them from wanting to engage in a wellness intervention (Brondolo, 2018). If trauma and life stressors are so common, families may also have developed

resilience and adaptation skills while, within a population where childhood trauma and life stressors are uncommon, women do not know how to react. Societal perceptions and how trauma is viewed can therefore have significant impact on decisions about their health such as engaging in an intervention and attending the available wellness activities.

The types of activities were divided into the following wellness domains: nutrition, fitness, mindfulness and parenting (See Table 4). The Private insurance women were significantly more likely to attend activities related to nutrition, fitness and parenting/self-care. These results appear to be consistent with past research. Minorities, specifically African Americans, and low-income women are more likely to be obese, have poorer nutrition and are less likely to exercise (Baruth, Sharpe, Parra-Medina, & Wilcox, 2014). These factors are all related and intertwined with one another. If women are obese, they may be less willing to attend fitness classes because it might be more difficult for them to do the exercises. They may also not have a background of exercising which further discourages them to begin in a group setting. Low-income women are also more likely to have poorer nutrition and thus they might avoid attending activities relating to nutrition because they do not want to change their habits. Low-income women might have a poorer diet because of financial reasons or because they do not have time to cook meals, so cheap fast-food is the best option that fits in their lives (Lawrence & Barker, 2009) and they therefore do not feel like it is necessary or worthwhile to attend activities related to promoting healthier nutrition.

Regarding the attendance to the parenting activities, low-income women who have a history of ACES or life stressors have been shown to engage less in parenting programs. Retention is also a difficulty within this at-risk population (*Read "Parenting Matters, 2016*). One possible explanation are that stigmas exist around parenting classes. Women may feel

defensive about being perceived as bad mothers and therefore avoid parenting classes. They also may lack the support from a partner and this can further discourage women from attending parenting activities (Alvidrez & Azocar, 1999).

Overall message.

The findings between the Medicaid women and Private insurance women showed the Medicaid women start the perinatal period with poorer nutrition, more stress, less sleep but more exercise. While exercise is a health promoting activity, some of the Medicaid women reported exercising not for their leisure, but rather their job required constant walking or movement. This could explain why, although the Medicaid women reported more exercise, they also reported higher levels of stress. The significant life factors that influenced total communication, goals made and activity attendance included ACES, level of education and poorer nutrition. The modifiable and unmodifiable life factors seem to be interrelated, explaining the results. The findings also showed that barriers to engagement are significantly different for women with Medicaid versus Private insurance, and thus these groups should likely be investigated and understood separately in future research.

Follow-up Research.

The results from this study showed 1) a clear disparity in engagement between women in Medicaid and women with Private insurance and 2) that risk impacts engagement differently for each group of women. These stark differences between the two risk/insurance groups, clearly demonstrate that there are significant barriers that the Medicaid women face, either preventing them or discouraging them from engaging. The results support that while women in Medicaid would benefit the most from perinatal wellness interventions, they are less likely to engage.

This stark disparity between the two risk groups and their engagement from our preliminary results is what fueled a second iteration of the study. The second cycle of the VFBA in the obstetrics setting will focus 1) only on the overburdened women with Medicaid in order to isolate the specific barriers and address them to increase engagement and promote health within an at-risk/high-risk population.

Secondly, the second study will focus on efforts to reduce barriers to engagement for women with Medicaid by adding incentives for activity participation, providing transportation, childcare free of cost and grocery vouchers. They will also focus FWC communication to texting based on our finding showing that Medicaid women were more likely to respond to texts or email than calling. With a sharper focus on women at highest risk with a better understanding of who they are and which barriers are in their way, we hope to alleviate those barriers and enable these women to have better care and accessibility to wellness promoting activities so they have the chance for optimal health as well.

Limitations.

While the results of this study supported other studies that demonstrated disadvantaged, at-risk women are less likely to engage in wellness interventions, yet tend to have poorer health, there were some limitations. Similar to many other wellness interventions, our population of participants was majority white (Alvidrez & Azocar, 1999). While our cohort was representative of Vermont, as the majority of the state's population is white, racial minorities have been shown to be significantly associated with low SES, more ACES and increased risk for emotional and physical health problems (J. Hudziak & Ivanova, 2016; Williams, Priest, & Anderson, 2016). Therefore, to truly test the effectiveness of this intervention, a more diverse cohort would be ideal.

Another limitation of this study was that we did not ask the women subjectively what was preventing them from engaging. For some women, they may not have participated or engaged with the intervention simply because they were not interested in what the study had to offer. In many ways, we assumed all low-income women were not participating because of certain barriers that existed, preventing them from participating. However, how do we know the women simply were not interested? To examine this reasoning, we could have qualitatively asked women questions such as why did you not participate? What would have made them engage more such as different classes? Leaving it up for the women to respond and give input might give different insight for the difference in engagement.

One last limitation to the study was the location of the activities. They were held at the UVM Medical Center which is where all participants received their perinatal care. In many ways, this was convenient because they could attend activities either before or after their appointments and reduce traveling time. However, many women have, on average, one perinatal visit per week throughout their pregnancy (“Prenatal care and tests,” 2016). This brings up the barrier again of accessibility. If women were to receive vouchers for gyms or yoga studios closer to their homes or work, they may be more likely to attend due to less travel time or gas money.

Strengths.

The VFBA in the obstetrics setting is a unique approach to wellness interventions. Unlike other studies that prescribe a certain number of classes, the VFBA allows for the participants to choose the level and type of engagement with the hopes of promoting a sustainable for future health practices, even after the study ends. The study offers evidence-based activities and places emotional and behavioral health at the center of all health. By

focusing on the participant's history of trauma and identifying unmodifiable versus modifiable life factors as well as cumulative risk, a more holistic and individually tailored approach of the participant is taken.

Another strength of the study was that it took place in Vermont. As explained before, the income threshold for Medicaid is much lower than the rest of the country ("Medicaid's Role for Women," 2019) ("Eligibility," 2019). This means that more women have access to healthcare than most other states. Vermont also has a lower infant mortality rate compared to the rest of the country ("Explore Uninsured in Vermont | 2018 Annual Report," 2018). Our subset of women are therefore not necessarily representative of the rest of the country because more women are insured and potentially have better wellness. If we were to implement this study in another place where the threshold for Medicaid was higher and less women were able to get health insurance, I believe even fewer people would engage. While it is excellent that Vermont women may have better wellness because more women receive insurance, it may not be entirely representative of the rest of the country.

Conclusions regarding Public Policy.

The results of my analyses support previous findings that show a clear disparity amongst low SES women and their engagement in wellness interventions. The outstanding question then is why does this disparity exist? Especially when the low SES women are more likely to have had a history of ACES, life stressors, more stress, poorer nutrition etc, which are dangers to the future health outcomes. The clear difference between the risk groups is poverty.

It seems that no matter what free wellness classes are offered during an intervention, if the women are impoverished, they will not engage. Maslow's hierarchy of needs is a motivational theory that says basic human needs need to be satisfied before progressing onto

higher levels. The bottom tier begins with basic physiological needs such as air, food, drink, water, shelter, warmth etc. Only once those needs are satisfied will someone progress to the next tier of safety needs including order, law, stability and freedom from fear. It isn't until around tier 4 or 5 that things related to wellness interventions such as yoga, mindfulness, etc., would be considered (McLeod, 2018). Extensive studies have looked at how poverty affects classroom engagement. Students who go to school without breakfast are particularly at risk for poorer performance and academic success, as this negatively impacts their attention, reasoning, learning and memory (Jensen, 2013). These studies help demonstrate that lacking basic needs like proper nutrition impedes higher order needs of engagement and health promotion.

In the case of perinatal women, if impoverished women are struggling to put food on the table, or living paycheck to paycheck in order to afford someplace to live, wellness promotion interventions are not necessarily a priority, and with good reason. Interventions only last so long, so even if low SES women engage during the intervention, it is not sustainable after it ends. The incentives offered in study 2 will help women make wellness a priority. Things like grocery vouchers will fulfill lower order needs, allowing for other needs besides the basic necessities, to be addressed. So is poverty what matters? Are wellness activities and interventions only helpful for women who are of a certain SES and their first couple of tiers are met? To further examine whether poverty is truly the determining factor for engagement in wellness interventions. Our next study iteration will be investigating engagement incentives. We will be able to test this theory and examine whether incentives like grocery vouchers increase participation because they help fulfill lower order/necessity needs. Future studies could also examine how mothers choose to allocate funds when given stipends. For example, if a wellness intervention gave each participant a weekly stipend and the participants saved it or used it for things like rent or food

instead of the wellness activities, this would suggest no matter what wellness activities are offered for free, if the women do not have a certain income, they will not engage. Overall, conclusions point to evidence that, poverty and its accompanying risk factors must be explored and attended to prior to health promotion intervention disseminations in the future.

References

- Adenekan, B., Pandey, A., Mckenzie, S., Zizi, F., Casimir, G., & Jean-Louis, G. (2013). Sleep in America: Role of Racial/Ethnic Differences. *Sleep Medicine Reviews, 17*(4), 255–262. <https://doi.org/10.1016/j.smr.2012.07.002>
- Alhusen, J. L., Ayres, L., & DePriest, K. (2016). Effects of Maternal Mental Health on Engagement in Favorable Health Practices During Pregnancy. *Journal of Midwifery & Women's Health, 61*(2), 210–216. <https://doi.org/10.1111/jmwh.12407>
- Alhusen, J. L., Bower, K., Epstein, E., & Sharps, P. (2016). Racial Discrimination and Adverse Birth Outcomes: An Integrative Review. *Journal of Midwifery & Women's Health, 61*(6), 707–720. <https://doi.org/10.1111/jmwh.12490>
- Alvidrez, J., & Azocar, F. (1999). Distressed women's clinic patients:: Preferences for mental health treatments and perceived obstacles. *General Hospital Psychiatry, 21*(5), 340–347. [https://doi.org/10.1016/S0163-8343\(99\)00038-9](https://doi.org/10.1016/S0163-8343(99)00038-9)
- Baruth, M., Sharpe, P. A., Parra-Medina, D., & Wilcox, S. (2014). Perceived barriers to exercise and healthy eating among women from disadvantaged neighborhoods: Results from a focus groups assessment. *Women & Health, 54*(4), 336–353. <https://doi.org/10.1080/03630242.2014.896443>
- Beddoe, A. E., Lee, K. A., Weiss, S. J., Powell Kennedy, H., & Yang, C.-P. P. (2010). Effects of Mindful Yoga on Sleep in Pregnant Women: A Pilot Study. *Biological Research For Nursing, 11*(4), 363–370. <https://doi.org/10.1177/1099800409356320>
- Black, D. S., Sussman, S., Johnson, C. A., & Milam, J. (2012). Psychometric Assessment of the Mindful Attention Awareness Scale (MAAS) Among Chinese Adolescents. *Assessment, 19*(1), 42–52. <https://doi.org/10.1177/1073191111415365>

- Blanco-Muñoz, J., Torres-Sánchez, L., & López-Carrillo, L. (2009). Exposure to Maternal and Paternal Tobacco Consumption and Risk of Spontaneous Abortion. *Public Health Reports, 124*(2), 317–322.
- Brondolo, E. (2018). Higher Stress Among Minority and Low-Income Populations Can Lead to Health Disparities, Says Report. Retrieved April 28, 2019, from <https://www.apa.org> website: <https://www.apa.org/news/press/releases/2018/01/stress-minority-income>
- Brown, D. W., Anda, R. F., Tiemeier, H., Felitti, V. J., Edwards, V. J., Croft, J. B., & Giles, W. H. (2009). Adverse Childhood Experiences and the Risk of Premature Mortality. *American Journal of Preventive Medicine, 37*(5), 389–396.
<https://doi.org/10.1016/j.amepre.2009.06.021>
- Bublitz, M. H., Vergara-Lopez, C., Treter, M. O., & Stroud, L. R. (2016). Association of Lower Socioeconomic Position in Pregnancy with Lower Diurnal Cortisol Production and Lower Birthweight in Male Infants. *Clinical Therapeutics, 38*(2), 265–274.
<https://doi.org/10.1016/j.clinthera.2015.12.007>
- Carnevale, A., Rose, S., & Cheah, B. (2007). *The College Payoff*. Georgetown University.
- Dhillon, A., Sparkes, E., & Duarte, R. V. (2017). Mindfulness-Based Interventions During Pregnancy: a Systematic Review and Meta-analysis. *Mindfulness, 8*(6), 1421–1437.
<https://doi.org/10.1007/s12671-017-0726-x>
- DiClemente, C. C., Dolan-Mullen, P., & Windsor, R. A. (2000). The process of pregnancy smoking cessation: implications for interventions. *Tobacco Control, 9*(suppl 3), iii16.
https://doi.org/10.1136/tc.9.suppl_3.iii16
- Douglas-Hall, A., & Chau, M. (2007). Parents' Low Education Leads to Low Income, Despite Full-Time Employment. Retrieved March 25, 2019, from

http://www.nccp.org/publications/pub_786.html

Edvardsson, K., Ivarsson, A., Eurenus, E., Garvare, R., Nyström, M. E., Small, R., & Mogren, I. (2011). Giving offspring a healthy start: parents' experiences of health promotion and lifestyle change during pregnancy and early parenthood. *BMC Public Health, 11*(1), 936. <https://doi.org/10.1186/1471-2458-11-936>

Eligibility. (2019). Retrieved April 28, 2019, from

<https://www.medicaid.gov/medicaid/eligibility/>

Ethnic and Racial Minorities & Socioeconomic Status. (2019). Retrieved March 24, 2019, from

<https://www.apa.org> website:

<https://www.apa.org/pi/ses/resources/publications/minorities>

Explore Uninsured in Vermont | 2018 Annual Report. (2018). Retrieved April 29, 2019, from

America's Health Rankings website:

<https://www.americashealthrankings.org/explore/annual/measure/HealthInsurance/state/V>

T

Fofana, L. (2017). Why Access to Healthy Foods in Low Income Communities is Important for Resilience. Retrieved April 28, 2019, from <https://www.healthcareready.org/blog/why-access-to-healthy-foods-in-low-income-communities-is-important-for-resilience>

Giurgescu, C., Zenk, S. N., Engeland, C. G., Garfield, L., & Templin, T. N. (2017). Racial Discrimination and Psychological Wellbeing of Pregnant Women. *MCN. The American Journal of Maternal Child Nursing, 42*(1), 8–13.

<https://doi.org/10.1097/NMC.0000000000000297>

Green, L. W. (1970). Manual for Scoring Socioeconomic Status for Research on Health Behavior. *Public Health Reports (1896-1970), 85*(9), 815–827.

<https://doi.org/10.2307/4593972>

Grote, N. K., Zuckoff, A., Swartz, H., Bledsoe, S. E., & Geibel, S. (2007, October). Engaging Women Who Are Depressed and Economically Disadvantaged in Mental Health Treatment. Retrieved April 10, 2019, from Google Docs website:

https://drive.google.com/file/d/1RFYE4IxAHAY-y0exqdG2kZO8fGOpLpEU/view?usp=embed_facebook

Holbrook, H., O'Loughlin, K., Althoff, R., Douglas-Palumberi, H., Kaufman, J., & Hudziak, J. J. (2017). The Yale-Vermont Adversity in Childhood Scale: A quantitative approach to adversity assessment. Retrieved April 28, 2019, from <https://slideplayer.com/slide/10695509/>

Hollinshead, A. B. (1975). *Four Factor Index of Social Status*. Yale University.

How does level of education relate to poverty? (2014). Retrieved March 25, 2019, from UC Davis Center for Poverty Research website: <https://poverty.ucdavis.edu/faq/how-does-level-education-relate-poverty>

Hudziak, J., & Ivanova, M. Y. (2016). The Vermont Family Based Approach: Family Based Health Promotion, Illness Prevention, and Intervention. *Child and Adolescent Psychiatric Clinics of North America*, 25(2), 167–178. <https://doi.org/10.1016/j.chc.2015.11.002>

Hudziak, J. J., & Meike. (2008). *Developmental Psychopathology and Wellness*. American Psychiatric Publishing Inc.

Jensen, E. (2013). *How Poverty Affects Classroom Engagement*.

Kim, I.-G., & So, W.-Y. (2014). The Relationship between Household Income and Physical Activity in Korea. *Journal of Physical Therapy Science*, 26(12), 1887–1889. <https://doi.org/10.1589/jpts.26.1887>

- Kingsbury, J. H., Buxton, O. M., & Emmons, K. M. (2013). Sleep and its Relationship to Racial and Ethnic Disparities in Cardiovascular Disease. *Current Cardiovascular Risk Reports*, 7(5). <https://doi.org/10.1007/s12170-013-0330-0>
- Kontinen, H., Sarlio-Lähteenkorva, S., Silventoinen, K., Männistö, S., & Haukkala, A. (2013). Socio-economic disparities in the consumption of vegetables, fruit and energy-dense foods: the role of motive priorities. *Public Health Nutrition*, 16(5), 873–882. <https://doi.org/10.1017/S1368980012003540>
- Lawrence, W., & Barker, M. (2009). A review of factors affecting the food choices of disadvantaged women: Workshop on ‘Changing nutrition behaviour to improve maternal and fetal health.’ *Proceedings of the Nutrition Society*, 68(2), 189–194. <https://doi.org/10.1017/S0029665109001013>
- McDonnell, C. G., & Valentino, K. (2016). Intergenerational Effects of Childhood Trauma: Evaluating Pathways Among Maternal ACEs, Perinatal Depressive Symptoms, and Infant Outcomes - Christina G. McDonnell, Kristin Valentino, 2016. Retrieved April 27, 2019, from <https://journals.sagepub.com/doi/pdf/10.1177/1077559516659556>
- McLeod, S. (2018). Maslow’s Hierarchy of Needs. Retrieved April 26, 2019, from Simply Psychology website: <https://www.simplypsychology.org/maslow.html>
- Medicaid’s Role for Women [2019]. (2019, March 28). Retrieved April 24, 2019, from The Henry J. Kaiser Family Foundation website: <https://www.kff.org/womens-health-policy/fact-sheet/medicaids-role-for-women/>
- Metzler, M., Merrick, M. T., Klevens, J., Ports, K. A., & Ford, D. C. (2017). Adverse childhood experiences and life opportunities: Shifting the narrative. *Children and Youth Services Review*, 72, 141–149. <https://doi.org/10.1016/j.childyouth.2016.10.021>

Muzik, M., & Borovska, S. (2010). Perinatal depression: implications for child mental health.

Retrieved March 29, 2019, from

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3083253/>

Muzik, M., Hamilton, S. E., Lisa Rosenblum, K., Waxler, E., & Hadi, Z. (2012). Mindfulness yoga during pregnancy for psychiatrically at-risk women: Preliminary results from a pilot feasibility study. *Complementary Therapies in Clinical Practice, 18*(4), 235–240.

<https://doi.org/10.1016/j.ctcp.2012.06.006>

Muzik, M., McGinnis, E. W., Bocknek, E., Morelen, D., Rosenblum, K. L., Liberzon, I., ...

Abelson, J. L. (2016). Ptsd Symptoms Across Pregnancy and Early Postpartum Among Women with Lifetime Ptsd Diagnosis. *Depression and Anxiety, 33*(7), 584–591.

<https://doi.org/10.1002/da.22465>

Narendran, S., Nagarathna, R., Narendran, V., Gunasheela, S., & Nagendra, H. R. R. (2005).

Efficacy of Yoga on Pregnancy Outcome. *The Journal of Alternative and Complementary Medicine, 11*(2), 237–244. <https://doi.org/10.1089/acm.2005.11.237>

Nutrition During Pregnancy. (2018). Retrieved April 28, 2019, from

<https://www.acog.org/Patients/FAQs/Nutrition-During-Pregnancy>

Parenting Matters: Supporting Parents of Children Ages 0-8. (2016).

<https://doi.org/10.17226/21868>

Peterson, R. D., Krivo, L. J., Vélez, M., & Lyons, C. (n.d.). *Race/Ethnicity and Neighborhood*

Crime in U.S. Urban Areas: Towards an Understanding of Changes Over Time. 28.

Prenatal care and tests. (2016, December 13). Retrieved April 29, 2019, from womenshealth.gov

website: <https://www.womenshealth.gov/pregnancy/youre-pregnant-now-what/prenatal-care-and-tests>

- Rinaldi, C. M., & Howe, N. (2012). Mothers' and fathers' parenting styles and associations with toddlers' externalizing, internalizing, and adaptive behaviors. *Early Childhood Research Quarterly, 27*(2), 266–273. <https://doi.org/10.1016/j.ecresq.2011.08.001>
- Ruiz, J. R., Perales, M., Pelaez, M., Lopez, C., Lucia, A., & Barakat, R. (2013). Supervised Exercise–Based Intervention to Prevent Excessive Gestational Weight Gain: A Randomized Controlled Trial. *Mayo Clinic Proceedings, 88*(12), 1388–1397. <https://doi.org/10.1016/j.mayocp.2013.07.020>
- Salm Ward, T. C., Mazul, M., Ngui, E. M., Bridgewater, F. D., & Harley, A. E. (2013). “You Learn to Go Last”: Perceptions of Prenatal Care Experiences among African-American Women with Limited Incomes. *Maternal and Child Health Journal, 17*(10), 1753–1759. <https://doi.org/10.1007/s10995-012-1194-5>
- Stephenson, L. A., Beck, K., Busuulwa, P., Rosan, C., Pariante, C. M., Pawlby, S., & Sethna, V. (2018). Perinatal interventions for mothers and fathers who are survivors of childhood sexual abuse. *Child Abuse & Neglect, 80*, 9–31. <https://doi.org/10.1016/j.chiabu.2018.03.018>
- Stress hormone spikes in pregnant women with PTSD. (2017, December 6). Retrieved April 10, 2019, from Futurity website: <https://www.futurity.org/ptsd-stress-cortisol-pregnancy-1623122/>
- Trentacosta, C. J., Hyde, L. W., Shaw, D. S., Dishion, T. J., Gardner, F., & Wilson, M. (2008). The relations among cumulative risk, parenting, and behavior problems during early childhood. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 49*(11), 1211–1219. <https://doi.org/10.1111/j.1469-7610.2008.01941.x>
- Vermont Population 2019 (Demographics, Maps, Graphs). (n.d.). Retrieved March 13, 2019,

from <http://worldpopulationreview.com/states/vermont-population/>

Vieten, C., & Astin, J. (2008). Effects of a mindfulness-based intervention during pregnancy on prenatal stress and mood: results of a pilot study. *Archives of Women's Mental Health*, *11*(1), 67–74. <https://doi.org/10.1007/s00737-008-0214-3>

What are some factors that make a pregnancy high risk? (2018). Retrieved March 30, 2019, from <https://www.nichd.nih.gov/health/topics/high-risk/conditioninfo/factors>

Williams, D. R., Priest, N., & Anderson, N. (2016). Understanding Associations between Race, Socioeconomic Status and Health: Patterns and Prospects. *Health Psychology : Official Journal of the Division of Health Psychology, American Psychological Association*, *35*(4), 407–411. <https://doi.org/10.1037/hea0000242>

	Medicaid (N=33)	Private (N=60)	Total (N=93)	Statistics
Age	29.33	31.52	30.74	t (91) = 1.96, *p = 0.053
Ethnicity				
White	84.8% (28)	88.3% (53)	87.1% (81)	X (1) = 0.23, p = 0.631
Minorities	15.2% (5)	11.7% (7)	12.9% (12)	
Hollingshead				
Edu	5.14	6.31	5.90 (84, SD = 1.21)	t (82) = 4.74, *p = 0.014
Job	4.18	6.39	5.65 (84, SD = 2.13)	t (82) = 5.13, p = 0.551
HH Total	37.6	49.4	73 (81, SD = 19.4)	t (79) = 5.45, p = 0.216
% Edu less than HS	31% (9)	7.3% (4)	15.5% (13)	
% Edu B.S. or more	69% (20)	92.7% (51)	84.5% (71)	
Cumulative Risk	1.33 (30, SD = 0.606)	1.25 (56, SD = 0.437)	1.28 (86, SD = 0.501)	t (84) = -0.734, p = 0.465

Table 2. Adverse Childhood Events (ACES) and other life stressors.

ACE Category	Medicaid (N=33)	Private (N=60)	National Average (N=9,367)	Statistics
<i>Abuse</i>				
Emotional Abuse	37.5% (12)	16.7% (10)	13.10%	X (1) = 4.98, *p = 0.039
Physical Abuse	46.9% (15)	11.7% (7)	27%	X (1) = 14.2, *p = 0.000
Sexual Abuse	12.1% (4)	3.3% (2)	24.70%	X (1) = 2.72, p = 0.181
<i>Household Challenges</i>				
Mother Treated Violently	27.3% (9)	10% (6)	13.70%	X (1) = 4.71, *p = 0.041

Household Substance Abuse	36.4% (12)	28.3% (17)	29.50%	X (1) = 0.640, p = 0.486
Household Mental Illness	6.1%	8.3%	7.5%	X (2) = 1.16, p = 0.561
Parental Separation or Divorce	57.6% (19)	31.7% (19)	24.50%	X (1) = 5.91, *p = 0.027
Incarcerated Household Member	18.2% (6)	8.3% (5)	5.20%	X (1) = 1.98, p = 0.189
<i>Neglect</i>				
Emotional Neglect	53.1% (17)	23.3% (14)	16.70%	X (1) = 8.29, *p = 0.006
Physical Neglect	21.2% (7)	6.7% (4)	9.20%	X (1) = 4.32, *p = 0.049
At least 1 ACE	69.7% (23)	56.7% (34)	61.3% (57)	X (1) = 1.52, p = 0.269
ACE Score	3.12 (SD = 2.93)	1.48 (SD = 1.89)	2.06 (SD = 1.51)	T (91) = -3.27, *p = 0.002
Life Stressors <i>(i.e. car accident)</i>	1.75 (SD = 1.71)	3.33 (SD = 1.53)	2.41 (SD = 1.51)	T (91) = -1.28, p = 0.205
Number of Adverse Childhood Experiences (ACE Score)	VFBA Women (N=93)	National Women (N=9,367)		
0	38.70%	34.50%		
1	17.20%	24.50%		
2	10.80%	15.50%		
3	7.50%	10.30%		
4 or more	25.80%	15.20%		

Table 3. Modifiable risks during the perinatal period

	Medicaid (N=30)	Private (N=60)	Total (N=93)	Statistics
Partner Drug Problem	12.1% (4)	5.0% (3)	7.5% (7)	X (1) = 2.01, p = 0.240
Mental Health				
Internalizing	50.5 (4, SD = 21.4)	37.7 (3, SD = 12.5)	46.6 (91, SD = 10.9)	t (89) = 0.210, p = 0.834
Internalizing % above 65	9.1% (3)	3.4% (2)	5.38% (5)	x (1) = 1.29, p = 0.349
Externalizing	55.0 (4, SD = 17.4)	40.7 (3, SD = 6.35)	45.9 (91, SD = 9.58)	t (89) = 0.243, p = 0.809
Externalizing % above 65	6.1% (2)	3.4% (2)	4.3% (4)	x (1) = 0.342, p = 0.619
Mindfulness MAAS Score	4.20 (33)	4.40 (60)	4.33 (93, SD = 0.927)	t (91) = 0.992, p = 0.324
Nutrition				
Poor Nutrition	19.4 (33)	18.1 (60)	18.5 (93)	t (91) = -2.11, *p = 0.038
Sleep				
Sleep Quality	2.48	1.92	2.12 (93, SD = 0.793)	t (91) = -3.51, *p = 0.001
Hours' Sleep	7.05 (1.68)	7.82 (0.925)	7.55 (92, SD = 1.28)	t (90) = 2.84, *p=0.006
Stress				
PSS Total Score	27.1 (32, SD = 8.81)	2.30 (60, SD = 6.81)	24.1 (92, SD = 7.85)	t (90) = -2.87, *p = 0.005
Exercise				
Exercise Mins/Wk	159.9 (33, SD = 270.1)	138.8 (60, SD = 183.5)	852 (93, SD = 6,589)	t (91) = -0.447, *p = 0.160

Table 4. Subject engagement

	Medicaid (N=30)	Private (N=60)	Total (N=93)	Statistics
Communication				
To FFC	23.2 (17, SD = 19.6)	26.2 (30, SD = 17.5)	25.1 (47, SD = 18.1)	t (45) = 0.528, p = 0.600
From FFC				t (46) = 1.10, p = 0.276
Total	38.4 (17, SD = 20.8)	44.4 (31, SD = 16.4)	42.3 (48, SD = 18.1)	t (46) = 0.792, *p = 0.00
	61.6 (17, SD = 9.24)	69.7 (31, SD = 31.4)	66.9 (48, SD = 33.7)	
Ratio of Response				
% Text	0.079 (22, SD = 0.158)	0.015 (31, SD = 0.328)	0.0414 (53, SD = 0.108)	t (51) = -2.19, *p = 0.033
% Email	0.171 (22, SD = 0.186)	0.313 (31, SD = 0.134)	0.254 (53, SD = 0.171)	t (51) = 3.23, *p = 0.002

% Call	0.002 (22, SD = 0.006)	0.002 (31, SD = 0.006)	0.002 (53, SD = 0.006)	t (51) = -0.050, p = 0.905
Goals				
Total	1.50 (22, SD = 1.77)	3.29 (31, SD = 1.31)	2.55 (53, SD = 1.74)	t (51) = 4.26, *p = 0.026
<i>Nutrition</i>	6.1% (2)	20% (12)	15.1% (14)	t (1) = 3.24, p = 0.127
<i>Fitness</i>	12.1% (4)	20% (12)	17.2% (16)	t (1) = 0.928, p = 0.401
<i>Sleep</i>	6.7% (4)	12.1% (4)	8.6% (8)	t (1) = 0.806, p = 0.448
<i>Parenting</i>	18.2% (6)	28.3% (17)	24.7% (23)	t (1) = 1.18, p = 0.324
<i>Community</i>	3.0% (1)	8.3% (5)	6.5% (6)	t (1) = 0.992, p = 0.417
<i>Reading</i>	6.1% (2)	10% (6)	8.6% (8)	t (1) = 0.420, p = 0.707
<i>Music</i>	3.0% (1)	11.7% (7)	8.6% (8)	t (1) = 2.02, p = 0.252
<i>Yoga</i>	24.2% (8)	41.7% (25)	35.5% (33)	t (1) = 2.82, p = 0.115
<i>Mindful</i>	15.2% (5)	23.3% (14)	20.4% (19)	t (1) = 0.877, p = 0.27
Engagement Activities				
Nutrition	0.909 (22, SD = 0.294)	0.936 (31, SD = 2.08)	0.585 (53, SD = 1.64)	t (51) = 1.80, *p = 0.065
Fitness	1.64 (22, SD = 3.29)	6.97 (31, SD = 8.47)	4.75 (53, SD = 7.27)	t (51) = 2.8, *p = 0.007
Mindfulness	0.773 (22, SD = 0.254)	0.516 (31, SD = 1.96)	0.623 (53, SD = 1.13)	t (51) = -0.812, p = 0.421
Parenting	0.318 (22, SD = 0.716)	3.03 (31, SD = 4.08)	1.91 (53, SD = 3.41)	t (51) = 3.08, *p = 0.003
<3 or Control	75.8% (25)	68.3% (48)	78.5% (73)	x (1) = 0.470, p = 0.485
>4 Activities	24.2% (8)	31.7% (19)	29% (27)	

Table 5. Correlation matrix of unmodifiable life factors.

	Age	Race	Hollingshead	Education	Total ACES
Race	0.081				
Hollingshead	0.051	-0.168			
Education	0.266*	-0.143	0.591**		
Total ACES	-0.128	0.147	-0.158	-0.123	
Cumulative Risk	0.410**	-0.503**	0.033	0.124	-0.134

Note. ** Correlation is significant at the 0.01 level, * Correlation is significant at the 0.05 level.

Table 6. Correlation matrix of modifiable life factors with each other.

	Partner Drug	Internal izing	Extern alizing	Perceive d Stress	Sleep Hrs	Sleep Quality	Unhealthy nutrition	Exercise
Internalizing	-0.086							
Externalizing	-0.012	0.812**						
Perceived Stress	0.185	-0.155	-0.075					
Sleep Hrs	-0.027	0.164	0.132	-0.296**				
Sleep Quality	0.112	-0.201	-0.139	0.375**	-0.736**			
Poor Nutrition	0.125	0.213*	0.203	0.199	-0.105	0.156		
Exercise	**0.361	-0.093	-0.031	0.323**	0.055	0.111	0.140	
Mindfulness	0.003	0.066	0.103	-0.586**	0.154	-0.234*	-0.106	-0.158

Note. ** Correlation is significant at the 0.01 level, * Correlation is significant at the 0.05 level.

Table 7. Correlation matrix of unmodifiable life factors with engagement

	Total Goals Made	Total Communication	Total Activities Attended	Fitness Activities Attended	Parenting Activities Attended	Self-Care Activities Attended
Age	0.071	0.063	-0.065	-0.271	-0.555*	0.033
Race	-0.107	-0.235	-0.256	-0.269	-0.202	-0.440**
Hollingshead	0.162	0.088	0.317*	0.395*	0.288	0.140
Education	0.504**	0.206	0.234	-0.262	-0.097	0.327*
Total ACES	0.009	-0.048	-0.447**	-0.553**	-0.460*	-0.284*
Cumulative Risk	0.051	0.201	0.110	0.152	-0.252	0.294*

Note. ** Correlation is significant at the 0.01 level, * Correlation is significant at the 0.05 level.

Table 8. Correlation matrix of modifiable life factors with engagement

	Total Goals Made	Total Communication	Total Activities Attended	Fitness Activities Attended	Parenting Activities Attended	Self-Care Activities Attended
Partner Drug	-0.030	-0.182	-0.197	0	0	-0.167
Internalizing	-0.069	-0.087	-0.028	0.232	0.163	-0.005
Externalizing	-0.030	-0.261	0.012	0.504**	-0.028	0.179
Perceived Stress	-0.124	0.011	-0.116	-0.210	-0.279	-0.049
Sleep Hrs	0.219	0.211	0.212	0.343	0.265	-0.089
Sleep Quality	-0.049	-0.132	-0.250	-0.507**	-0.228	0.131
Poor Nutrition	-0.137	-0.334*	0.152	0.117	-0.157	-0.038
Exercise	-0.209	-0.214	-0.111	0.019	-0.099	-0.113
Mindfulness	0.005	-0.002	0.266	0.375*	0.315	0.127

Note. ** Correlation is significant at the 0.01 level, * Correlation is significant at the 0.05 level.