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Religious Commitment as a Predictor of Decreased Blood Pressure

in High-Risk Pregnancies of Southern Appalachia

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A thesis

presented to

the faculty of the Department of Psychology

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Master of Arts in Psychology

_____

by

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May 2011

_____

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Dr. William Dalton

Keywords: Religiosity, Religious Commitment, Blood Pressure, Pregnancy

ABSTRACT

Religious Commitment as a Predictor of Lower Blood Pressure

in High-Risk Pregnancies of Southern Appalachia

by

Anna Vadimovna Ermakova

Extensive literature review inspired a mediational model of the relationship between Religiosity/Spirituality (R/S) and Blood Pressure (BP) tested through secondary analyses of data from the TIPS program. Participants included 205 (92.1% Caucasian; age M=23.72, SD=5.33) pregnant Southern Appalachian women drawn from the region's at-risk pregnancy population. The only variables correlated with BP were women's weight (r=.430, r=.467, p<.01, for diastolic and systolic BP, respectively) and prenatal care use (r=.138, p<.05, with diastolic BP), but not R/S. Multiple regression analyses confirmed participant weight as the only significant independent predictor of BP. Previous findings of health benefits of R/S cannot be assumed to generalize to pregnant women without further study. Limitations of this study and possible explanations for the findings are discussed.

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CHAPTER 1

INTRODUCTION

Pregnancy is a decisive time both for the mother and for the developing child. The
mother's physiology, emotions, nutrition, and lifestyle have significant impact on the fetus that
often lasts well into the child's adolescent and sometimes even adult years (e.g., Barker, 1993;
Engle, Tomashek, Wallman, & the Committee on Fetus and Newborn., 2007; Moster, Lie, &
Markestad, 2008). Among the known pregnancy risk factors that predict premature birth or low
birth weight is high blood pressure, which may lead to preeclampsia or eclampsia (March of
Dimes, 2007a). It is known that higher-than-normal body mass index, smoking, age, and stress
are among factors that predict hypertension or higher blood pressure during pregnancy (e.g.,
Hixson, Gruchow, & Morgan, 1998; Leeman & Fontaine, 2008). While some actual stressors
may not be possible to eliminate, it has been demonstrated that religiously committed individuals
are less likely to experience stressors, possibly due to their healthier behaviors and/or help
provided by their religious communities (e.g., Ellison & Levin, 1998; Krause, 1999), and that the
perception of stress can be buffered via religious/spiritual belief and attitudes (e.g., Pargament et
al., 1990). If it is possible that religious commitment can eliminate some actual stressors and/or
reduce the effect of stress on health, potentially lowering the mother's blood pressure and
eventually impacting birth outcomes, then this hypothesis is worthy of investigation.

Multiple studies over the course of several decades have established a connection
between religiosity and/or spirituality and health (e.g., George, Larson, Koenig, & McCullough,
2000; Hill & Pargament, 2003). Although controversy exists, most researchers agree that
religious commitment, defined differently by various investigators (as described further),
predicts better health outcomes, from lower morbidity to a better immune system (e.g., Masters,

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2008; McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000). With as much work as there is in this field, Masters and Spielmans (2007) insisted that the investigation of religion's effect on health needs "empirical studies based on clear conceptual models that include precise operational definitions and psychometrically sufficient measures" (p. 335). Indeed, religiosity and/or spirituality have been measured with dozens of instruments, defined using numerous perspectives, and hypothesized to affect health measures via different pathways, not all of which have been based on conceptual models.

One of the goals of this study was to examine the existing religion-health literature in order to arrive at the measures of religiosity/spirituality that would be most predictive of lower blood pressure. The best empirically supported health-related religiosity measures were used to operationally define religious commitment. Taking into consideration proposed paths by which religiosity affects health, a theoretically-driven model for this study was developed. This allowed for statistically estimating direct and indirect paths for the effect of religious commitment on blood pressure through several mediational and direct pathways. Thus, the objective of this study was to examine if religious commitment predicts lower blood pressure in women experiencing high-risk pregnancies in rural southern Appalachia. Pregnancies examined for this study are considered at-risk due to this region's risk factors, including low socioeconomic status, poor education, low health literacy, high substance use, intimate partner violence, and so forth, as described further.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews literature pertinent to the subject of investigation of this thesis. It

consists of four sections. First, predictors of high blood pressure in pregnancy and its impact are

discussed to establish the importance of the problem. Second, the general relationship between

religiosity/spirituality and health is reviewed, including the proposed pathways of this

relationship. A model for the study is developed as a result. The third section covers existing

literature specifically on the religiosity-blood pressure link. Finally, measures of

religiosity/spirituality are examined in section four in order to arrive at this study's operational

definition of religious commitment that is relevant to high blood pressure in pregnancy and to the

culture of the region of rural Southern Appalachia.

<u>Impact and Predictors of High Blood Pressure in Pregnancy</u>

<u>Risks Related to High Blood Pressure in Pregnancy</u>

March of Dimes Foundation (2007a) lists various risks that can cause complications

during pregnancy and endanger the health of the mother and/or the child. Among such risks are

anemia, gestational diabetes, high blood pressure, vaginal bleeding, various infections, sexually

transmitted diseases, structural abnormalities, depression, and so forth (March of Dimes, 2007a).

High blood pressure during pregnancy is recognized among the major public health concerns

(e.g., Jim, Sharma, Kebede, & Acharya, 2010), which is why studies of ways to lower or prevent

it are so important. It is a risk to the health of the mother and the newborn in itself, and can also

be used as an indicator of high stress levels, which are harmful in other ways. Both are discussed

further.

High Blood Pressure as a Risk Factor for the Mother. According to the March of Dimes Foundation 2007b) high blood pressure during pregnancy can be harmful to the mother because it increases the risk of stroke and heart attack, as it does at any other time in life. Women who experience high blood pressure are at a risk of hypertension that may develop into pre-eclampsia in pregnancy. This is a dangerous condition that is accompanied by protein in the woman's urine (March of Dimes, 2007a). If pre-eclampsia is not treated, it can develop into eclampsia that is frequently associated with seizures and in severe cases, coma. While these conditions are not widespread, the March of Dimes Foundation encourages women with blood pressure problems to reduce and keep close watch of it during pregnancy (March of Dimes, 2007a).

High Blood Pressure as a Risk Factor for the Child. Additional serious risks of high blood pressure that come during pregnancy concern the developing baby. High blood pressure may result in constricted or narrowed blood vessels of the uterus that transport oxygen and nutrients to the fetus. Women who experience high blood pressure and extreme levels of stress are also at an increased risk of low birth weight and/or premature babies as well as placental abruption (March of Dimes, 2007a, 2010a).

Low birth weight and prematurity are a big concern because they put the baby at a higher risk of disabilities and health problems both in infancy and possibly throughout the lifespan. Babies are considered premature when they are born at fewer than 37 weeks of gestation (March of Dimes, 2010a). They are considered to have a low birth weight when they weigh less than 5 pounds, 8 ounces, or 2,500 grams (March of Dimes, 2008). Many of the harmful effects of prematurity and low birth weight overlap because prematurity is the primary reason for low birth weight in infants.

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Some of the medical problems sometimes associated with both low birth weight and preterm delivery are: respiratory distress syndrome that may cause the infant's lungs to collapse; intraventricular hemorrhage that may lead to high pressure and even damage in the brain; patent ductus arteriosus, associated with heart failure; necrotizing enterocolitis that results in feeding and abdominal difficulties; and retinopathy of prematurity that may lead to vision loss (March of Dimes, 2008, 2010a).

Additional risks associated with prematurity specifically include sleep apnea, jaundice, anemia, chronic lung disease (such as lung fluid, scarring or damage), difficulty with body temperature regulation (Engle et al., 2007), and an underdeveloped immune system that may lead to numerous kinds of infections in infancy (March of Dimes, 2010a).

There are also hypothesized long-term effects of low birth weight and prematurity. For example, Barker (1993) suggested that adults who had been born as low birthweight infants are at an increased (up to 10 times greater) risk of type 2 diabetes, heart disease, and hypertension themselves. According to the March of Dimes Foundation even late premature infants (born between 34 and 36 weeks of gestation) are 6 times more likely to die in the first week and 3 times more likely to die in the first year of their lives (March of Dimes, 2010a). The late premature baby's brain weighs only 66% of that of a full-term baby, which may predispose the former to learning and behavioral difficulties later in life (Engle et al., 2007). Others have hypothesized that premature infants are at a higher risk of cerebral palsy and developmental delays (Petrini et al., 2009) as well as mild disabilities later in life (Moster et al., 2008). Fetal growth restriction, which is a major cause of low birthweight, is recommended by the March of Dimes Foundation to be treated by altering maternal health conditions such as reducing high blood pressure (March of Dimes, 2008).

Finally, placental abruption, mentioned earlier as another possible consequence of high blood pressure, is a condition in which the placenta detaches from the uterus. This can cut off the fetus's supply of oxygen and nutrients and create bleeding in the mother that may put her life in danger (March of Dimes, 2005).

Clearly, women who experience high blood pressure are at an increased risk of serious complications during pregnancy and when the baby is born, making it essential for them to lower their blood pressure during pregnancy if possible. Additionally, high blood pressure may be a result of high levels of stress that carry their own risks and are discussed further.

High Blood Pressure and Stress. While everyone experiences a certain level of stress in every-day life, high levels of stress or chronic stress may have negative effects on pregnant women and outcomes of their pregnancies. Stress lowers the function of the immune system and leads to heart disease and hypertension (March of Dimes, 2010b). Thus, high blood pressure is sometimes indicative of increased stress levels, other contributing factors taken into account. Similar to findings with prenatal hypertension, when a high level of stress or chronic stress is experienced during pregnancy, the woman becomes at a higher risk for having a premature or low birth weight child (Institute of Medicine Committee on Understanding Premature Birth and Assuring Healthy Outcomes, Board on Health Sciences Policy, 2006), the dangers of which are discussed above. Finally, maternal stress has been hypothesized to affect the baby's mental and emotional development as well as predict learning disabilities and anxiety or fear levels, possibly through antenatal hormonal exchange between the mother and the baby (Bergman, Sarkar, O'Connor, Modi, & Glover, 2007; Talge, Neal, & Glover, 2007). While stress and high blood pressure are closely related, they do not overlap completely, and thus both constructs were measured in this study.

In summary, there are numerous known and probable problems associated with high blood pressure in pregnancy. Among these are placental abruption, low infant birthweight, premature birth, preeclampsia, and in extreme cases of hypertension, eclampsia (March of Dimes 2007a). Additionally, high blood pressure may be viewed both as an outcome and an indicator of elevated stress levels that are associated with other maternal and infant health problems (March of Dimes, 2010b).

Predictors of High Blood Pressure in Pregnancy

Although the central focus of this study involves the impact Religious Commitment may have on blood pressure, first one must take into account risk factors and include them in the statistical analyses. Such predictors of higher blood pressure in pregnancy include: higher maternal weight and age, multiple gestations, presence of diabetes, diet rich in oils and sugars, little physical activity, smoking, alcohol consumption, and stress (e.g., Hixson et al., 1998; Leeman & Fontaine, 2008; Wong, Dixon, Gilbride, Chin, & Kwan, 2010).

The main correlate of blood pressure that Religious Commitment is likely to impact is the level of stress. This may happen through increased social support (Krause, 1999), fewer stressors (George et al., 2000), or more effective coping with stress (Pargament, 1999). The subject of investigation of this study is whether Religious Commitment is related to lower blood pressure in pregnant women of Southern Appalachia through impacting some of the predictors of high blood pressure, as well as through a direct relationship with blood pressure.

Pregnancy Risk Factors in Southern Appalachia

The focus of this study is high risk pregnancies of rural Appalachia, an area with a high incidence of poor birth outcomes. Among the risk factors for poor birth outcomes in this area are rurality, low socioeconomic status (Bailey & Jones Cole, 2009), and poor education (Luo,

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Wilkins, & Kramer, 2006). Borders, Grobman, Amsden, and Holl (2007) found that low-income women, such as many of those in this population, often experience chronic stress as a result of concern about food, unemployment, shelter, and so forth, which puts them at a high risk of having low birthweight babies. Additionally, intimate partner violence (IPV) is a pregnancy risk factor prevalent in Southern Appalachia. Bailey and Daugherty (2007) indicate rates of 25% or more for physical, 20% sexual, and 80% psychological IPV reported by pregnant women of the region. Substance abuse is an important risk factor in Southern Appalachia, with pregnancy smoking at the level of 25%-40% (Bailey, 2006) and hard drug-positive screens among pregnant women at 20% (Bailey & Wright, 2011).

Many of these risk factors are either sources of or possibly results of high stress levels, both which lead to poor birth outcomes and poor health of the mother (e.g. Woods, Melville, Guo, Fan, & Gavin, 2010). It has been suggested by Kemp and Hatmaker (1993) that stress – generated by severe problems during pregnancy such as low levels of social support, financial struggle, IPV, and so forth – may be the primary cause of why these factors often result in poor birth outcomes and health problems of the mother. Risky behaviors like drug, alcohol, and cigarette use during pregnancy that are also associated with numerous problems in infants' and mothers' health, are often ways of coping with stress (Kemp & Hatmaker, 1993). Thus, it is evident that the population of rural Southern Appalachia is at high risk of poor birth outcomes, and it is important to investigate how these outcomes may be avoided. Actual stressors and perceived stress are related to health complications including high blood pressure, and their reduction is a necessary subject of investigation in this population.

Religiosity-Health Relationship

Religiosity-Health Research

Before beginning the main discussion, it should be noted that the terms religion, or religiosity, and spirituality (R/S) are used interchangeably in this paper and are related constructs. While there is not a definite distinction criterion between the two concepts, the main difference is that religion is usually considered to be a more formal and institutional phenomenon, while spirituality is viewed as a subjective experience or an emotion toward a higher power (Koenig, McCullough, & Larson, 2001). Most of the time, however, spiritual people consider themselves religious as well (Marler & Hadaway, 2002), for example those who have emotions toward and subjective experiences with their God often encounter them in the context of a church or during religious activities. This is not always true, but because the concepts are so connected and inter-related (Hill et al., 2000), they are often used interchangeably and will be throughout this document.

While R/S used to be viewed as incompatible with scientific study, that is no longer the case. Hundreds of studies have been published defining various religious variables, investigating their prevalence, and establishing their relationships to different psychological and physiological measures (e.g., Gorsuch, 1976; Gorsuch, 2002; Fetzer Institute/NIA, 1999; Hill & Hood, 1999). Notably, researchers in the field of health psychology have been interested in investigating R/S and its impact on health and well-being (Hill & Pargament, 2003; Hood, Spilka, Hunsberger, & Gorsuch, 1996; Spilka, Hood, Hunsburger, & Gorsuch, 2003).

Numerous studies have found R/S predicting lowered risk of mortality and morbidity among the elderly and medical patients (e.g., Ellison & Levin, 1998; McCullough et al., 2000; Oxman, Freeman, & Manheimer, 1995; Strawbridge, Cohen, Shema, & Kaplan, 1997) and

longer life-expectancy in general (e.g., Hummer, Rogers, Nam, & Ellison, 1999). Investigators have also found favorable effects of various measures of R/S on ailments such as stroke, hypertension, heart disease, gastrointestinal disease, cancer, emphysema, liver disease, as well as self-reported health and disability (e.g., Ellison & Levin, 1998; Idler & Kasl, 1992; Powell, Shahabi, & Thoresen, 2003; Tartaro, Luecken, & Gunn, 2005).

Research has been robust in the area of R/S and mental health as well, establishing almost unanimously a positive correlation between the two. Different measures of R/S have been shown to predict lower levels of depression, anxiety, distress, and psychological disorders (e.g., Bergin, 1983; Ellison, 1991; Larson, Sherrill, Lyons, Craigie, & Theilman, 1992) and better psychological and existential well-being overall (Pollner, 1989; Wong-McDonald & Gorsuch, 2004).

Clearly, there is a link between R/S and both subjective and objective well-being among many different population groups. Pregnancy is not an exception (Gorsuch & Key, 1974; Page, Ellison, & Lee, 2009).

Religiosity-Health Pathways

As the number of studies that established a religion-health link has increased in the last 20 years, researchers have become interested in the means by which R/S affects health outcomes. The most common explanatory pathways mentioned in the literature are: healthy behaviors or lifestyle, social support, and psychological resources. Each is briefly addressed below.

Health Behaviors. The most apparent way that R/S influences health and longevity is through unhealthy or risky behaviors it usually discourages. For example, most religious groups advise moderation in alcohol consumption (e.g., Amodeo, Kurtz, & Cutter, 1992; Cochran, Beeghley, & Bock, 1988; Holt, Miller, Naimi, & Sui, 2006), discourage smoking and drug use

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(e.g., Ellison & Levin, 1998; Gillum, 2005; Gorsuch, 1993), and disapprove of promiscuous and premarital sex (Burdette, Ellison, Sherkat, & Gore, 2007; Ellison & Levin, 1998). Christian belief specifically dictates that one's body is a temple for the Holy Spirit (Dull & Skokan, 1995), and thus discourages unhealthy and, sometimes, risky behaviors in general (Ellison & Levin, 1998). Masters (2008) also drew a relationship between religious practices and better adherence to medical regimens.

In summary, it is agreed upon in research that religiosity impacts many health behaviors that in turn tend to predict positive health outcomes. This is why a study of the effect of R/S on health should always include measures of the health behaviors that account for a significant part of this effect.

Social Support. Another well-established R/S-health pathway is through social support. Most religious and/or spiritual individuals tend to be a part of a community of like-minded others who are encouraged to be a support to one another. Krause (1999) identified two ways that religious groups may provide their members with health-enhancing social support benefits: actual help (e.g., financial assistance, help in time of need, information), and perceived support (e.g., feeling of belonging, acceptance), – both of which reduce actual and/or perceived stress in one's life. Ellison and Levin (1998) referred to these as objective and subjective support, respectively.

These benefits are true of any social support network, but research has yielded evidence that religious support (support from members of one's congregation or religious community) has stress-buffering effects above and beyond those of secular support (Krause, 2006). George et al. (2000) pointed out that religious people tend to have larger social networks, to interact more with them, and to be more satisfied with them than nonreligious people are with their networks. One

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unique characteristic of religious support is that in the Judeo-Christian faith, for example, forgiveness, love, and help in need are some of the most cherished virtues (Ellison & Levin, 1998; George et al., 2000; Krause, 2006). Churches and other religious organizations also often have formal support offered to their members and the community, such as recovery groups or support groups focused on overcoming an unhealthy behavior (Eng, Hatch, & Callan, 1985; Kumanyika & Charleston, 1992). Finally, the psychological benefits of social support are higher when both parties in the support exchange have a similar interpretation of stress or suffering and the approach to stressful life events, as do adherents of the same faith (Ellison, 1994; George, Ellison, & Larson, 2002; Maton, 1987).

While the promotion of healthy behaviors is the most direct way that R/S affects health, social support is one of the most popular explanations of the stress-buffering function of R/S. On the other hand, some researchers have proposed that religious social support accounts for only 5% to 10% of the R/S-health connection (George et al, 2000).

Disagreement does exist as to whether social support in religious/spiritual people acts as an independent influence on health or whether it is a mediator between religiosity and health. There have been differing findings (Ferraro & Koch, 1994; Koenig et al., 1999; Musick, Koenig, Hays, & Cohen, 1998), but if one is to study the R/S-health relationship, the contribution of social support should be included.

Psychological Resources. Aside from encouraging religious adherents to develop healthy lifestyles and providing them with quality support networks, R/S affects the person psychologically. For example, religious attitudes and practices are often accompanied by positive emotions such as a sense of peace, contentment, forgiveness and love in prayer and worship (George et al., 2000). These emotions, in addition to belief and motivational orientations, are

capable of affecting one's immune and endocrine systems among other physiological mechanisms (Ader, Felten, & Cohen, 1991; Hughes, 1997; Masters, 2008).

Faith in a God that is believed to love and help the religious adherent has a positive effect on health because it enables committed believers to have an optimistic attitude about their circumstances (George et al., 2000). In addition to trust in a higher power in general, believers may have an optimistic attitude toward their circumstances as an outcome of their prayers. The two are closely related and have been suggested to be predictive of well-being (Breslin & Lewis, 2008; Dull & Skokan, 1995; Ellison & Levin, 1998).

By far the most empirically supported psychological resource that R/S offers is coping. R/S commitment provides the religious adherent with meaning in difficult times as well as with seeing his or her life as a part of a larger force or a divine plan and purpose, and stressful circumstances as spiritual growth opportunities (e.g., Foley, 1988; George et al., 2000; Masters, 2008; Pargament, 1999). These factors influence one's appraisal and, as a result, experience of stressors (Dull & Skokan, 1995). In the face of such stress as sickness and even serious chronic conditions, religious coping has been found predictive of recovery or shorter illness (George et al, 2000; Mattlin, Wethington, & Kessler, 1990; Pargament, 1997).

Religious commitment also impacts feelings of control (Dull & Skokan, 1995). Committed believers tend to be higher in locus of control in God – as opposed to self, others, or luck – which has been correlated with better spiritual and existential well-being (Wong-McDonald & Gorsuch, 2004).

Finally, as relationships are often the source of stress, the role of spiritual values such as love, compassion, and forgiveness is evident in the relationship between stress and inter-personal

conflict (George et al., 2000). Such values may also be associated with lower stress levels in response to maltreatment or injustice by others.

It is important to note that all the aforementioned things are true mostly of those who have positive religious coping styles and an internalized belief system (Masters, 2008). Thus, the term "Religious Commitment" is used as the name of the main independent variable in the present research paper to reflect this internalized belief system that predicts that the person is most likely to use positive coping styles and benefit from R/S-health effects.

The research on the religiosity-stress relationship is especially important in this study as high blood pressure is often predicted by elevated stress levels, as mentioned above. It is possible that by reducing actual and perceived stress in one's life, R/S also impacts blood pressure.

Religiosity-Health Research Model

The R/S-health relationship has been proposed in literature to take effect through the three general pathways described above: health behaviors (e.g., Gillum, 2005; Holt et al., 2006), social support (e.g., Krause, 1999; Krause, 2006), and psychological resources (e.g., Dull & Skokan, 1995; George et al., 2000).

Additionally, many researchers have pointed at the fact that these pathways fail to explain all of religion's effect on health, and that there is a fourth pathway that may be metaphysical in nature and beyond the scope of empirical research (Breslin & Lewis, 2008; Ellison & Levin, 1998; Masters, 2008).

In summary, several researchers have proposed models that incorporate these mediational pathways or a variation of them (Breslin & Lewis, 2008; Dull & Skokan, 1995; Ellison & Levin, 1998; George et al., 2000; Masters, 2008). Figure 1 represents a summary of their hypotheses.

D1 is the statistical disturbance variable, referred to above as the direct pathway that cannot be measured empirically but is hypothesized to exist in the influence of R/S on health. It can also represent the effect of R/S on health not accounted for by the other three pathways. D2 represents extraneous variables aside from R/S that influence health.
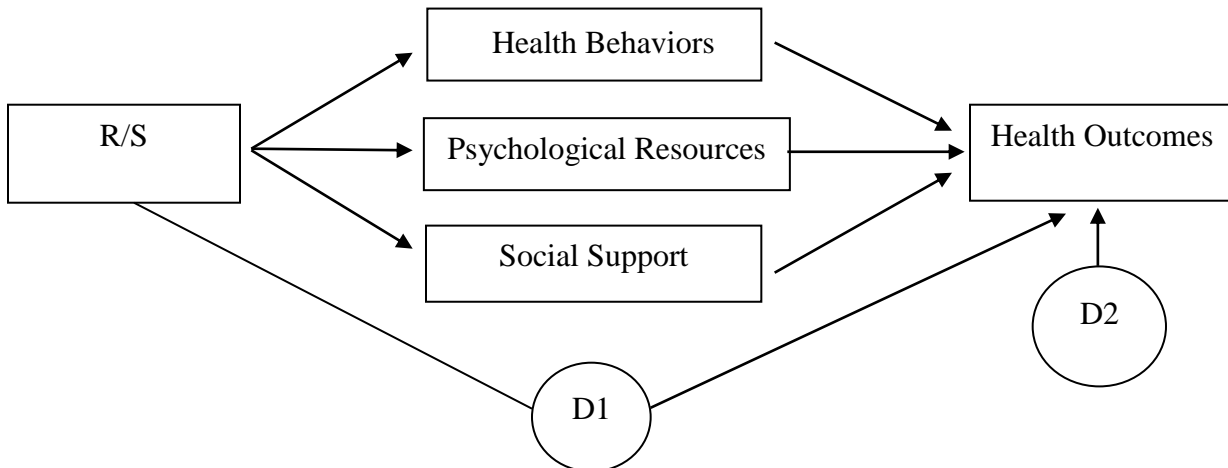
Figure 1. Effect of R/S on Health Outcomes

Religiosity-Blood Pressure Relationship

As can be seen, a great deal of research has been done to demonstrate the link between religiosity and different aspects of health and well-being. Pertinent to this report are the studies that have been done on the relationship between religiosity and high blood pressure specifically. Nine most recent studies are reviewed below, including descriptions of measures of religiosity used in each and their results

Hixson et al. (1998) analyzed data from 112 adult (over 35 years old) white females of Judeo-Christian tradition from North Carolina for their study. The researchers used a multidimensional measure of religiosity that included: intrinsic religiosity, extrinsic religiosity, belief factor, religious well-being, organized religious activity, nonorganized religious activity, religious knowledge, religious experiences, and religious coping. Both systolic and diastolic blood pressures were measured. The researchers used multiple regression path analysis to

analyze the direct effects of the religious constructs on both systolic and diastolic blood pressure and the indirect effects through smoking patterns, alcohol consumption, dietary nutrient intake, and physical activity. The results of this study suggested that the direct effect of religiosity on blood pressure was stronger than the indirect effect through the aforementioned pathways. Moreover, diastolic blood pressure was impacted more than systolic, with the strongest effects observed for the religious constructs of intrinsic religiosity (total effect of -0.218) and religious coping (total effect of -0.193) (Hixson et al., 1998).

Walsh (1998) studied the R/S-hypertension relationship in 137 immigrants who resided in Ohio between 1977 and 1982. The participants differed in terms of gender, nationality, and age. The researcher used two variables to define religious commitment, the predictor variable in his study: church attendance (dichotomized into once a week or more and less than once a week) and a measure of how important the participants' religion was to them. Controlling for height-weight ratio, family cardiovascular background, kidney problems, smoking, alcohol consumption, exercise, and eating habits, Walsh found a significant negative relationship between religious commitment, as he defined it, and blood pressure (b=-2.664, $p<.01$ for systolic, and b=-2.319, $p<.001$ for diastolic). The significant relationship held when social support was controlled for.

The results of a study by Steffen, Hinderliter, Blumenthal, and Sherwood (2001) are slightly different. Their study sample included 155 participants of both genders, Caucasian and African American. Subjects using tobacco products, taking hypertension medicine, or suffering from above-mild hypertension were excluded from the study. The researchers found that religious coping interacted with race to predict lower ambulatory (systolic: $t = 2.42$, $p < .05$; diastolic: $t = 2.64$, $p < .01$) and clinic blood pressure (systolic: $t = 1.95$, $p = .05$; diastolic: $t = 2.21$, $p < .05$) in black respondents, but not in white respondents. Social support satisfaction was

also related to lower blood pressure in African Americans in the sample but did not act as a mediator between religious coping and blood pressure (Steffen et al., 2001). These results demonstrate the importance of investigating the role of religious coping and social support in blood pressure studies but cast doubt on the generalizability of findings across different population groups. It should be kept in mind, however, that the pathway of religiosity's influence on blood pressure through health behaviors was not included in the examination, and many hypertensive patients were excluded.

On the other hand, Koenig, George, et al. (1998) studied blood pressure in the elderly (65 and above) and found statistically significantly lower blood pressure in both Whites and Blacks associated with religious attendance (once a week or more) and private religious activities (prayer and Bible study). The authors did note that the effect was more pronounced among Black and younger elderly. This effect also held when controlled for blood pressure medicine regimen. Those participants of the study who had both infrequent religious attendance and infrequent private religious activities were 40% more likely to have diastolic pressure of 90 mm Hg and above ($p < .0001$) (Koenig, George, et al., 1998).

Masters, Hill, Kircher, Benson, and Fallon (2004) conducted an experiment that exposed participants to cognitive and interpersonal stressors while measuring their blood pressure. Older (60 years old and above) and younger (18-24 years old) adults were recruited for this study. The participants were categorized as mainly intrinsically or mainly extrinsically motivated with regard to R/S, based on their score on the Religious Orientation Scale (Allport & Ross, 1967). The researchers found that while intrinsic and extrinsic orientation were not different in their effect on blood pressure in younger adults, intrinsic orientation in older adults predicted lower reactivity to stress (measured by the blood pressure), compared to their extrinsically motivated

counterparts. Moreover, the older, intrinsically motivated participants did not differ significantly from the younger participants in stress reactivity.

Tartaro et al. (2005) measured cortisol levels and blood pressure in 60 undergraduate students as measures of stress in response to laboratory stressors. The BMMRS (Brief Multidimensional Measurement of Religiousness/Spirituality, discussed further in this paper) was used as a predictor, and the results showed that a composite variable of religiosity/spirituality, religiosity, frequency of prayer, and religious attendance were related to lower blood pressure in males and higher blood pressure in females. A shortcoming of this study is that only one male reported high religiosity, so the highly and moderately religious groups were combined for analysis.

A study by Gillum and Ingram (2006) measured R/S through frequency of religious attendance in a sample of 14,475 Americans (20 years of age and above). The researchers found that after controlling for health and demographic variables, more frequent attendance negatively predicted hypertension, with results significant for weekly (β=-0.24, p<.01) and more than weekly (β=-0.33, p<.05) attendance. The weekly and more than weekly attenders were likely to have systolic blood pressure of 1.46 mm Hg (p<.01) and 3.03 mm Hg (p<.01) lower than nonattenders, respectively (Gillum & Ingram, 2006). This study did not observe any gender interactions.

A study by Buck, Williams, Musick, and Sternthal (2009) showed no significant relationship between religious attendance and hypertension in their sample of 3,105 adults from Chicago. They did find, however, that three-item measures of life meaning and forgiveness of self and others predicted lower diastolic blood pressure (b=-.37, $p \leq$.01; b=-.45, $p \leq$.05,

respectively) and a decreased likelihood of hypertension in this sample (OR .93, $p \leq$.05; OR .90, $p \leq$.05, respectively).

Finally, Fitchett and Powell (2009) studied 1,658 midlife women across the U.S. who took an eight-item Daily Spiritual Experiences Scale (Underwood & Teresi, 2002). They found that daily spiritual experiences (also included in the BMMRS) were not protective of systolic blood pressure or hypertension. Diastolic blood pressure was not investigated in this study.

These nine most recent studies on the relationship between R/S and blood pressure show promise of an existing link between the two constructs in this field of investigation. Most studies found that R/S predicts lower blood pressure, although not all of them. The results differed depending on the study's sample and the operational definition of R/S used. Religious constructs that have the most support for being related to blood pressure were Intrinsicness (Hixson et al., 1998; Masters et al., 2004), Religious Coping (Hixson et al., 1998; Steffen et al., 2001) and Religious Attendance (Gillum & Ingram, 2006; Koenig, George et al., 1998; Tartaro et al., 2005; Walsh, 1998). These constructs are further discussed in the section on operationally defining Religious Commitment for this study. Other constructs that were hypothesized to be related to lower blood pressure were importance of R/S (Walsh, 1998), social support (Steffen et al., 2001), private religious practices in general (Koenig, George et al., 1998) and prayer specifically (Tartaro et al., 2005), meaning and forgiveness (Buck et al., 2009), and a general measure of R/S or religiosity (Tartaro et al., 2005). The construct of daily spiritual experiences was unrelated to systolic blood pressure in the study by Fitchett and Powell (2009).

Religiosity-Blood Pressure Research Model

Taking into account the risk factors that predict high blood pressure, as well as the ways that Religious Commitment may affect them, the model described previously in the section on

R/S and health in general needed to be adapted accordingly. Of the health behaviors that directly impact blood pressure during pregnancy, ones that are likely affected by Religious Commitment are smoking (e.g., Gillum, 2005), alcohol consumption (e.g., Holt et al., 2006), and the adequacy of prenatal care. In the pregnant population, few report any alcohol use during pregnancy (Cheng, Kettinger, Uduhiri & Hurt, 2011), which is why it was not considered in the model for this study. As mentioned previously, it is hypothesized by some researchers that individuals who are religious/spiritual are more likely to adhere to medical regimens (e.g., Masters, 2008). In the case of pregnancy this is represented by receiving prenatal care. Such care may contribute to lower blood pressure through BP medication being prescribed to the woman or medical advice for lowering BP being given by the health provider.

Health behaviors also have the potential to influence blood pressure indirectly through stress reduction. For example, if one is less prone to take unnecessary risks of bodily harm (e.g., Ellison & Levin, 1998) such as smoking her stress level is likely to be lower as a result, which has the potential to affect blood pressure. Adherence to medical prescriptions and advice is hypothesized to be related to lower stress as well (Dew et al., 2009).

As for the social support pathway through which Religious Commitment is hypothesized to impact health (e.g., Krause, 1999), the way it may be related to lower blood pressure is also through stress reduction. Any type of social support, whether actual or perceived, seems to lead to positive influence on blood pressure through buffering actual or perceived stress.

Researchers tend to focus on coping with stress when discussing psychological resources, the third pathway, even concerning health outcomes in general (e.g., Pargament, 1999). This focus is especially relevant when the health outcome of interest is blood pressure as stress has a strong positive correlation with blood pressure (Hixson et al., 1998).

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To follow Masters and Spielmans' (2007) call for theoretically-driven models for research referred to in the Introduction of this paper, I based this thesis investigation on the model in Figure 2, adapted from the models proposed by other researchers, such as that in Figure 1. The fourth hypothesized pathway remains intact in blood pressure research as reflective of uninvestigated influences of R/S on health, as well as influences on blood pressure not accounted for by the model, and is represented by variable D1. D2 represents extraneous variables aside from Religious Commitment that influence blood pressure, such as age and weight. The influence of these variables on blood pressure was discussed earlier, and they are controlled for in this model.
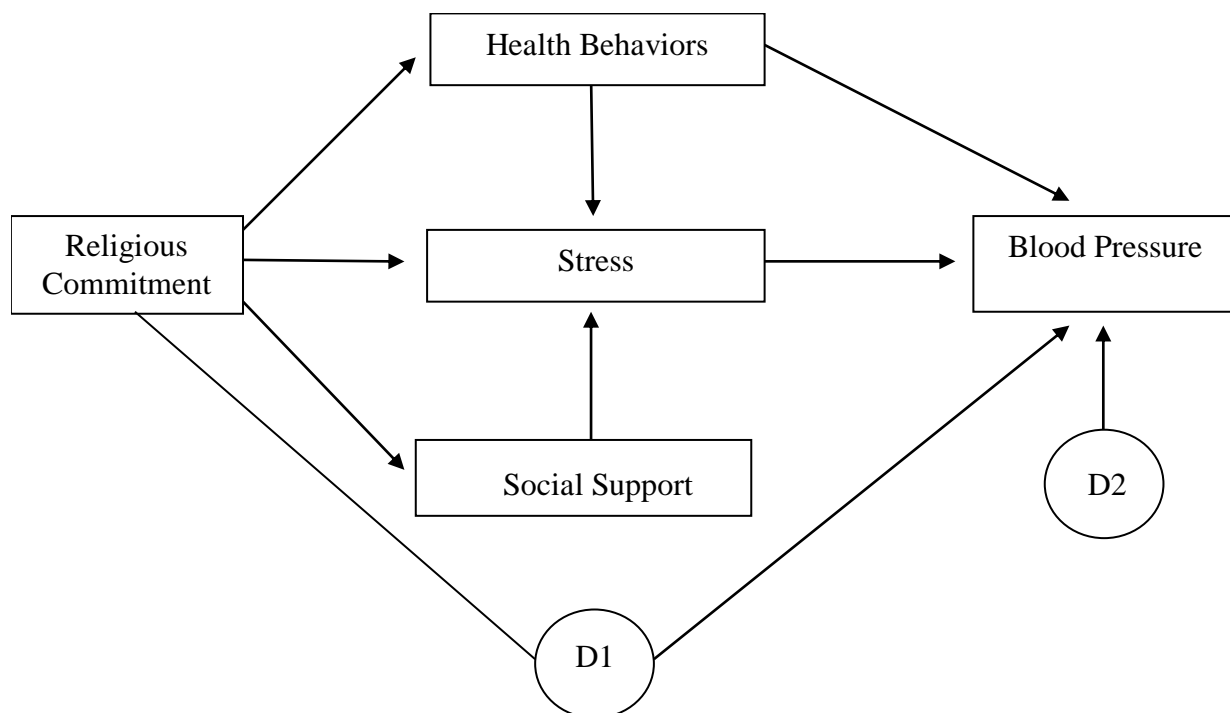
Figure 2. Effect of Religious Commitment on Blood Pressure

Health-Related Measurement of Religiosity/Spirituality

Development of Religiosity/Spirituality Measures

The incorporation of religiosity and spirituality into scientific discussion in the field of psychology started with Allport's (1950) famous book, *The Individual and His Religion: A*

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Psychological Interpretation. In it, Allport made the first attempt to classify religious

commitment by making a distinction between the religiously mature and immature people. With

the door to religiously-oriented psychological research opened, others pursued the development

of measures to examine religiosity or spirituality. Among them were Fichter (1954) who

attempted to classify Catholic believers by types, Lenski (1961) who distinguished church-

attenders by their motivation, and Wilson (1960) who made a scale to measure extrinsic religious

orientation of believers. Finally, Allport and Ross (1967) published the famous study on intrinsic

and extrinsic religiosity and their relation to prejudice, which is perhaps the one most frequently

recognized as the beginning of measurement of R/S (e.g., Donahue, 1985; Hill & Pargament,

2003).

Operationally Defining Religiosity/Spirituality

Allport and Ross (1967) eloquently stated that "[t]o know that a person is in some sense

'religious' is not as important as to know the role religion plays in the economy of his life" (p.

442), meaning that R/S is too broad of a measure and may mean a wide range of things. It is

important to investigate more specifically the role of R/S in an individual's life by using reliable

measures and for health research, measures that have been shown predictive of health outcomes.

Having discussed the effect that religiosity in general is proposed to have on health and

specifically blood pressure, I proceed in this section to describe various ways of measuring R/S,

in order to arrive at the most appropriate operational definition of Religious Commitment for this

research.

Scientists have defined and measured the R/S construct differently in their attempts to

predict its behavioral, social, psychological, or physiological outcomes. According to literature

reviews published by others, some of the most common traditional measures of a person's

religiousness have been: church attendance (Hill & Pargament, 2003; Koenig et al., 2001), frequency of prayer or Bible reading (Masters & Spielmans, 2007), or simply one's religious denomination (Hill & Pargament, 2003; Koenig et al., 2001). With more research being done in this area, however, it has become clear that R/S is a multidimensional concept (Hill & Hood, 1999) and that its different domains have the potential to affect a person's physical and mental health in different ways (Fetzer Institute/NIA, 1999). Emmons, Cheung, and Tehrani (1998) emphasize that the choice of the measure of religiousness used in research influences the extent to which the well-being measure under investigation is affected. In order to arrive at the most effective operational definition of Religious Commitment for the purpose of this study, I examined literature that offers varied perspectives on measuring the construct in relation to how it potentially affects health.

An important consideration for this specific investigation is the unique culture of rural Southern Appalachia. Much of the population of this region is religious: one study found that 64% of the region's population reports attending a church at least once a week (Clements, Schetzina, Rhodes, Dunn, & Cohen, 2009), which is not necessarily synonymous with being religiously committed. While the majority of this region's population reports belonging to a religious denomination, this does not necessarily predict their internalized belief system. The operational definition of Religious Commitment needs to include variables that separate the committed believers from the nominally religious. Based on recommendations of investigators in this area of research (Allport & Ross, 1967; Masters, 2008), they are to be distinguished because the effect of R/S on health may differ for the two groups.

Brief Multidimensional Measurement of Religiousness/Spirituality (BMMRS)

One of the best-recognized instruments in the area of religiosity and health is the Brief Multidimensional Measurement of Religiousness/Spirituality (BMMRS) developed by a team of researchers supported by the Fetzer Institute and the National Institute on Aging (Fetzer Institute/NIA, 1999) (see Appendix A). The researchers participating in this project recognized that R/S is a multidimensional construct and set out to identify those of its dimensions that are empirically and theoretically most closely connected with health outcomes. The author(s) of each section considered their domain's relationship to health outcomes through behavioral, social, psychological, and physiological pathways, closely paralleling the mediation model I use in this work. This section of the literature review examines the domains of the BMMRS and is designed to arrive at the most appropriate measure(s) to use as the operational definition of religious commitment in the research on managing stress in pregnancy.

As mentioned above, R/S draws psychological resources to reduce stress or perception of stress. Once again, this is true of believers or adherents who use positive coping skills (Pargament, Smith, Koenig, & Perez, 1998) and who have internalized their beliefs (Masters, 2008). In the same vein, Hill and Pargament (2003) identified four categories of R/S measures that are the most connected to health in theory and in function in the authors' review of measures of religiosity and spirituality. Two of these categories are "orienting, motivating forces" and "closeness to God." Measures that fall under these categories indeed reflect internalized beliefs. Both are discussed directly following.

Intrinsic Orientation. Hill and Pargament's (2003) construct of Orienting, Motivating Forces, is represented by such instruments as the Intrinsic/Extrinsic scale. In the BMMRS a similar construct is titled Commitment, singled out by Williams (1999) as the parameter that

separates genuine believers from nominally religious ones. The Commitment construct of the BMMRS is not to be confused with Religious Commitment, the variable used to define and measure religiosity in this study. The BMMRS construct of Commitment includes one question taken from the 10-item Intrinsic Religion Scale (Hoge, 1972) to assess to what extent R/S is a guiding force to the respondent. Intrinsic religiousness (Allport & Ross, 1967; Gorsuch & McPherson, 1989; Hoge, 1972) seems to reflect true commitment (Batson, 1976; Batson & Ventis, 1982) and was included in the BMMRS because of its well-established prediction of positive health outcomes.

Some of the ways in which intrinsic religious commitment is linked to health are purpose and direction in stressful times, greater access to positive spiritual coping methods, as well as practicing behaviors and attitudes considered virtuous, which have direct health benefits (Hill & Pargament, 2003). Commitment to God as the orienting force in life (i.e., intrinsic commitment) has also been linked to life satisfaction, life purpose, low conflict in one's goals, and subjective well-being (Emmons et al., 1998), as well as self-esteem, good family relationships, and good mental health (Payne, Bergin, Bielema, & Jenkins, 1991). Intrinsic religious orientation has also been proposed to be related to actual physical health (Allport, 1963; Masters, 2008), internal locus of control (Kahoe, 1974), and life purpose (Crandall & Rasmussen, 1975).

Especially important to this investigation is the research by Hixson et al. (1998), discussed previously, that suggested that intrinsic religious orientation and religious coping are most predictive of low blood pressure in adult females. These and other studies (e.g., Masters, 2008; Masters et al., 2004) have presented intrinsic religious motivation as a reliable measure of religious commitment and a useful predictor of health variables. The value of intrinsic religiousness to health outcomes has been established by many researchers, and it is therefore

important that it is included in the operational definition of Religious Commitment in this thesis' research.

Collaborative Religious Coping. Hill and Pargament (2003) pointed out that those who experience a close relationship with God or are securely attached to God (Kirkpatrick, 1995) have lower levels of stress and loneliness. The authors noted that Closeness to God is especially valuable to one's health in stressful situations and during major life stressors. One of the proposed constructs measuring Closeness to God in Hill and Pargament's report is Collaborative Coping, derived from the Religious Problem Solving Scale (RPSS) (Pargament et al., 1988). The BMMRS includes a Collaborative Coping item as well in its section on Religious/Spiritual Coping, deemed important to health (Pargament, 1999). As this paper includes the stress-reducing function of religiosity, a measure of closeness to God via coping is to be incorporated in the operational definition of Religious Commitment.

There are three types of religious coping that Pargament et al. (1988) identified and organized into the Religious Problem Solving Scale (RPSS): Self-Directed, Deferring, and Collaborative Coping. Self-Directed Coping reflects one's self-reliance in times of stress and is reflected on the RPSS and the BMMRS by questions like, "I try to make sense of the situation and decide what to do without relying on God" (Pargament et al., 1988; Pargament, 1999). This coping style negatively correlates with measures of religiosity that have established relations to health as church attendance, prayer, and intrinsic motivation (Pargament et al., 1988). Self-Directed Coping also negatively correlates with Spiritual Well-being (Paloutzian & Ellison, 1982) as well as locus of control in God (Wong-McDonald & Gorsuch, 2004). This is important, as LOC in God is associated with lower depression levels in Caucasians (Bjork, Lee, & Cohen,

1997) who compose most of the population of rural Southern Appalachia, and is predicted by Intrinsic religious motivation (Wong-McDonald & Gorsuch, 2004).

The second type, Deferring Coping, is reflective of a passive laissez-faire on the part of the believer, based not as much on trust in the higher power as on one's own sense of incompetence and low self-esteem (Pargament et al., 1988). Although this measure is significantly predicted by Intrinsic motivation, it is also predicted by Extrinsic-Personal orientation (Gorsuch & McPherson, 1989; Wong-McDonald & Gorsuch, 2004), which sometimes has opposite health implications. Additionally, it has been proposed that Intrinsic religious orientation is mediated by the religious coping styles, and that the Deferring style, for example, suppresses its positive effect on psychosocial competence (Hathaway & Pargament, 1990). Psychosocial competence was defined by Pargament, Tyler, and Steele (1979) as positive attitudes toward self and others and positive coping skills. Deferring Coping also moderately correlates with Spiritual Well-Being (Wong-McDonald & Gorsuch, 2004). It is agreed upon, however, that Deferring Coping is only a positive strategy for health in circumstances absolutely outside of one's control such as an incurable illness (Pargament, 1997). It also was not included in the BMMRS.

Finally, Collaborative Coping is an active coping style that incorporates both responsibility on the shoulders of the person and his or her trust in the higher power. On the BMMRS and RPSS, collaborative coping is represented by a question such as "I work together with God as partners to get through hard times" (Pargament et al., 1988; Pargament, 1999). This style of religious coping finds the most support for health relationships in literature, compared to the other styles, for instance in studies regarding anxiety, guilt, and depression (Pargament, 1999). It is positively correlated with church attendance, prayer, Spiritual Well-Being, as well as

LOC in God and Intrinsic religious motivation (Wong-McDonald & Gorsuch, 2004). The benefits of these correlates have been discussed throughout this paper. Collaborative Coping is also more positively correlated with self-esteem than the Self-Directing Coping style (Pargament et al., 1988). Research has demonstrated that Collaborative Coping relates to psychosocial competence as well (Hathaway & Pargament, 1990).

Based on these considerations, Collaborative Coping reflects Closeness to God much better than the other religious coping styles. Research has shown that Collaborative Coping is positively related to self-reported health (Krause, 1998) and better adjustment to serious illness (Koenig, Pargament, & Nielsen, 1998). Moreover, both nonreligious and religious coping measures relate to positive health outcomes; however, the effects of Collaborative Coping remain even when controlled for nonreligious coping (Hill & Pargament, 2003; Pargament et al., 1990).

Much research has pointed out the effectiveness of different measures of religiosity in predicting health outcomes. Pargament (1997) distinguishes dispositional measures from situational ones. Dispositional measures of R/S evaluate one's general attitudes or behaviors within his or her religious frame of reference. Situational measures of R/S are specific to a certain time or circumstance and may reflect that one's adherence to a religious creed is different in this circumstance than usually. According to Pargament religious coping is a situational stress-related measure of religiosity and accounts for variance in measures of health even after removing the effects of dispositional religious measures such as church attendance and commitment.

The domain of religious/spiritual coping is especially important to health in pregnancy research because stress is one of the consistent predictors of negative health outcomes in the both

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the mother and the newborn, including high blood pressure (Leeman & Fontaine, 2008). The effect of religiosity on blood pressure via psychosocial measures that reduce stress is the subject of interest of the present paper. While there is a definite positive effect of nonreligious coping with stress in pregnancy (e.g., Ayers, 2001; Yali & Lobel, 1999), Collaborative Religious Coping has been proposed to predict beneficial health outcomes in stressful situations above and beyond both nonreligious coping and global religious measures. This is why I included Collaborative Coping within the composite variable of Religious Commitment in this research on blood pressure in pregnancy.

Church Attendance. Church attendance has been the most common measure of organizational religiousness, and of religiosity overall, used in health research (Koenig et al., 2001). Consistent with this well-established practice in the study of R/S in relation to health, the BMMRS also includes a Likert scale of how often one attends religious services, ranging from never to several times a week under its Organizational Religiousness domain of R/S (Idler, 1999a).

Religious attendance predicts significantly lower mortality and morbidity (e.g., McCullough et al., 2000; Musick, House, & Williams, 2004) as well as decreased hypertension and functional disability (Levin, 1994) and has a positive relationship with longevity (Idler & Kasl, 1997). Idler (1999a) and George et al. (2002) suggested that frequent church attendance exposes one to a greater availability of social support, which, as it has been noted, is positively related to health outcomes (Krause, 1999). It may also be indicative of behavioral commitment to the religious belief system that could lead to decreased smoking, drinking, promiscuous sex, and so forth that also predict positive health measures (Idler, 1999a). Finally, attending religious services often reinforces the beliefs that provide the feelings of love, comfort, and understanding

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to the individual – all of which have also been associated with positive health outcomes (Pressman, Lyons, Larson, & Strain, 1990).

Additionally, studies connecting religious attendance to decreased blood pressure have already been conducted, as mentioned previously. In the Gillum and Ingram (2006) national study, weekly church attendance was associated with a 1.46 mm Hg decrease in systolic blood pressure ($p<.01$) and more than weekly attendance – with a 3.03 mm Hg decrease ($p<.01$).

It can be argued that religious attendance does not exclude extrinsically-motivated believers or those merely following a family custom or habit. The application of faith-related information to behaviors and emotions in personal life could be said to be more important indicators of health than attendance itself. Additionally, as noted in reference to other religiosity measures, Hathaway and Pargament (1990) argued that such dispositional measures as Organizational Religiousness or church attendance are not always reflective of one's response to situational stressors such as those specific to the time of pregnancy.

Even though these arguments against using dispositional measures in general and religious attendance specifically may be legitimate, the empirical evidence for health outcomes predicted by religious attendance is overwhelming, as attendance has been used to define religious commitment for decades. For this reason, I am compelled to include it as a part of the composite measure of Religious Commitment.

In order to address the criticisms of dispositional measures in R/S research, the Intrinsic Religiousness item (Allport & Ross, 1967; Hoge, 1972) that reflects the practice of lessons obtained as a result of religious attendance in everyday life was included in the composite variable of Religious Commitment. Situational religious measures are accounted for by including the Collaborative Coping item (Pargament et al., 1988). Idler (1999a) proposed that the effect of

Organizational Religiousness on health takes place via three mediators: health behaviors, social support, and psychosocial measures – all mentioned above and incorporated in the model used for this study.

Private Prayer. In contrast to organizational or public religiosity, Levin (1999) examined the dimension of Private Religious Practices for the BMMRS. This domain measures people's belief-based actions outside of religious institutions and includes an item on private prayer that asks "How often do you pray privately in places other than at church or synagogue?" (Levin, 1999).

Private prayer is another common dispositional measure of R/S. There is inconsistency in the literature about whether it is a valid reflection of how committed one is to his or her faith. Indeed, many studies have confirmed that the frequency of private prayer predicts such outcomes as better general and mental health, as well as vitality (Meisenhelder & Chandler, 2001), lower depression and anxiety, higher self-esteem (Maltby et al., 1999), hardiness (Carson, 1993), and subjective well-being (McCullough, 1995). It is also positively correlated with such measures of well-being as purpose in life (Caroll, 1993) and happiness and life satisfaction (Poloma & Pendleton, 1991). Prayer is also often associated with relaxation that has a positive effect on heart rate, breathing, and muscle tension (Finney & Malony, 1985; McCullough, 1995).

On the other hand, while most studies on prayer have positive findings, some have found that the effect is dependent on the type of prayer. For example, Poloma and Pendleton (1991) separated prayer into four types: colloquial prayer (i.e., simply talking to God or inquiring of Him on a personal level), petitionary prayer (i.e., asking for material things), ritual prayer (i.e., recited), and meditative prayer (i.e., nondirectional prayer expressing adoration or contemplating the sacred teaching). The researchers found that engaging exclusively in petitionary and

ritualistic prayer is negatively related to measures of well-being such as happiness and life satisfaction and positively related to negative affect (Poloma & Pendleton, 1991). A reason for these findings may be that people who do not practice colloquial and/or meditative prayer are possibly extrinsically motivated in their religious activities. The item on the BMMRS that asks about the frequency of prayer does not specify which type of prayer it is.

Additionally, there have been studies, especially among the elderly, that have found a negative correlation between health and private religiosity. A closer look reveals that this is often due to people becoming more committed to Private Religious Practices with older age (Levin, 1999). There can also be cohort effects—i.e., in cross sectional research, the older people may be part of a cohort (people raised in 1940s or 1950s) who was raised in more religious homes than people who will be elderly in 30 or 40 years.

The same is true of people who are more ill and therefore pray more; for example, even people who are not religiously committed pray when all other coping resources are exhausted (Masters & Spielmans, 2007). For this reason it is possible that pregnant women with high blood pressure may pray more, and the relationship between these measures would then be confounded or reversed, such as in the Levin et al. (1993) pregnancy study.

Finally, prayer, especially when the type of prayer is not specifically defined, could be reflective of the Quest religious motivation (Batson, 1976), characterized by nondirectional spiritual striving, which has been associated with mixed evidence regarding health outcomes (Ventis, 1995), unlike the Intrinsic motivation defined earlier. In light of these caveats with measures of prayer, it will not be included in this study despite its moderate empirical support.

Religious Support. Much research in the field of religiosity has focused on social support, as discussed above (e.g., Krause, 2006). It is not surprising that the BMMRS, too, includes

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Religious Support as one of its religiosity measures (Fetzer Institute/NIA, 1999). The Religious

Support dimension of the BMMRS was constructed by Krause (1999) based on secular measures

of social support that have been tested and shown to be reflective of social support as a stress

buffer in secular settings (Cohen & Willis, 1985). Religious Support reflects specifically the

perceived support or a lack thereof among the respondent's fellow congregation members

(Krause, 1999).

Our sample consists of women of different religious/spiritual preferences, and therefore,

while I have emphasized throughout this report that it is important to include a measure of social

support in this study, I will not limit it to a measure of religious social support as that would not

be a good measure of the social support for nonreligious women. Including a secular measure of

social support, however, would apply both to the nonreligious and the religious respondents, and

the effect of social support from adherents to the same faith would not be lost.

Other Religiosity/Spirituality Measures. As R/S is a multidimensional concept, there are

other domains that have been hypothesized to be related to health and have been included in the

BMMRS (Fetzer Institute/NIA, 1999). As reflected in the discussion of the operational definition

of Religious Commitment for this thesis thus far, the measures were chosen based either on their

direct connection to stress, which is a strong predictor of high blood pressure (Intrinsic

Religiosity, Collaborative Coping), or the overwhelming empirical evidence for their relationship

to health and widespread use in research (Religious Attendance).

Most of the measures included in the BMMRS did not meet these criteria. They either do

not have strong empirical support, but were merely hypothesized by the Fetzer Institute working

group to be predictive of health outcomes, or they are broad dispositional measures that may not

be effective in a specific time of stress. Thus, measures that apply directly to stress management

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or coping would predict health outcomes of pregnancy better than dispositional dimensions (Hathaway & Pargament, 1990; Pargament, 1999).

For the sake of brevity, Appendix B includes a table with a brief description of every measure included in the BMMRS, its hypothesized health effects, its relation to stress, its empirical support, and whether it is situational or dispositional. The table makes it clear why the three aforementioned measures were chosen for inclusion in the composite variable of Religious Commitment in the research on blood pressure in pregnancy. The complete BMMRS questionnaire is also included in Appendix A.

It is important to know that many of the measures overlap and some of the R/S dimensions not chosen to be a part of the operational definition of religious commitment often either assess similar psychological processes or may be the result of the processes behind the measures that were chosen. Overall, though, most of the R/S dimensions not chosen for the model are not highly predictive of health when used as stand-alone items according to the authors who developed each section of the BMMRS (Fetzer Institute/NIA, 1999).

Another important consideration in the choice of measures to operationally define religious commitment and the reason why all the scales on the BMMRS were not combined into a single predictor variable is the unique culture of rural Southern Appalachia, as stated previously. Dispositional religious variables that are predictive of health in other areas of the U.S. may not be predictive of it in this region because answering positively to general religious belief questions is a part of the culture. Social desirability in self-report measures may influence the reported levels of Religious Commitment (Hadaway, Marler, & Chaves, 1993), so measures that would compel honest answers and be predictive of health outcomes need to be carefully selected.

The study by Koenig et al. (2001) revealed that adherents who were both behaviorally and functionally committed to their religion were most prone to have lower blood pressure specifically. The measures selected based on the literature presented thus far are used together to form the composite variable of Religious Commitment in order to reflect this two-fold commitment. Behavioral commitment is represented by Religious Attendance, while functional commitment is reflected in the use of Collaborative Coping and Intrinsic religiosity. There are religious/spiritual people who adhere to one realm of commitment or the other. Based on health predictions and empirical research, those who are in the overlap zone of these realms are considered religiously committed in this study, as represented by Figure 3.
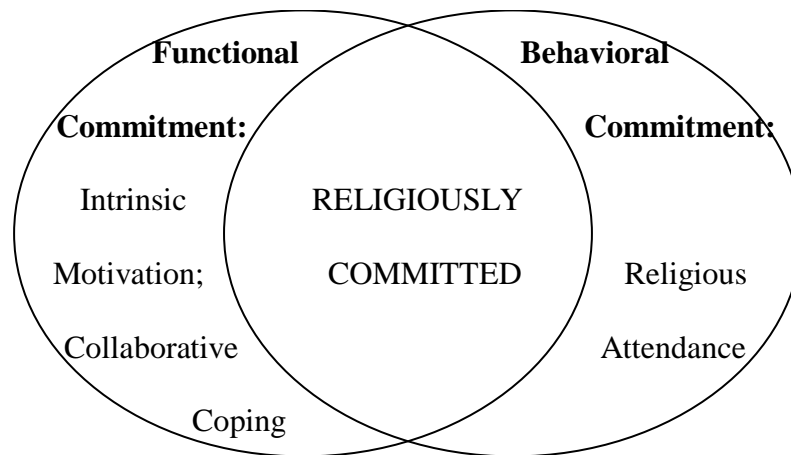
Figure 3. Operational Definition of Religious Commitment

In summary, high blood pressure poses risks in pregnancy that may lead to poor birth outcomes. Stress and unhealthy behaviors are among known predictors of high blood pressure. The literature suggests that Religious Commitment (an internalized adherence to one's faith) may predispose one to healthier behaviors, reduce perception of stress, decrease one's exposure to actual stressors, including unhealthy behaviors, and increase social support that may in turn lessen stressors' effects. There may be other unexplained pathways through which Religious Commitment is related to decreased blood pressure. Thus the hypothesis of this study is that high

levels of Religious Commitment – defined as a combination of religious attendance, intrinsic religious orientation, and collaborative religious coping – are likely to be associated with decreased blood pressure in pregnancies within a high risk population in rural Southern Appalachia. The proposed pathways through which Religious Commitment may be related to lower blood pressure are: affecting health behaviors, reducing stress, and increasing social support during pregnancy.

CHAPTER 3

METHODS

Population

The data for this study were drawn from existing data acquired through the Tennessee

Intervention for Pregnant Smokers (TIPS) program, a clinical intervention that has also involved

identification of pregnancy health risk factors since 2007. With East Tennessee State

University's IRB approval, prenatal patients receiving prenatal care in six counties of Northeast

Tennessee were recruited from health clinics and health departments for research participation

in the TIPS program. Two hundred forty-nine pregnant women (mean age = 24.45; SD = 5.93;

96% Caucasian; 4% other races) completed the prenatal portion of the TIPS research protocol,

including the BMMRS, as of March 1, 2010. Out of this sample, the data from 205 participants

were used for this analysis, and other cases were eliminated because of missing responses on

one or more items of interest.

In order to assess if the current study sample differs significantly from the total sample,

comparisons of demographics were made between the two samples (Table 1). These

comparisons demonstrate that the study sample is an adequate representation of the total sample.

Table 1

Comparison of Total Sample and Study Sample by Demographic Variables

	Total Sample Mean (SD) or % n=249	Study Sample Mean (SD) or % n=205	p value (between-sample difference)
Age, years	24.5 (5.9)	23.7 (5.3)	.702
Education, years	12.6 (2.1)	12.5 (2.0)	-.695

Table 1 (continued)

Race

White (%)	96.0	92.1	.819

Marital status

Married (%)	40.2	36.9	.894

Family income

Less than $20,000/year (%)	57.2	60.4	.833

Note. t-test was used for comparison of continuous variables, and Chi-square test was used for comparison of categorical variables.

Procedure

Collection of Original Data

The participants were recruited by a TIPS case manager at the office of their prenatal care provider. To participate in the research arm of the larger intervention program, they met with the TIPS case manager and completed two packets of questionnaires before delivery: one in the first and one in the third trimester. If a woman was not able to fill out the first-trimester packet due to late entry into prenatal care, she filled out a combined packet that included some questionnaires from both the first and third trimester packets.

Every participant was assigned an identification number in order to keep information confidential. The participants were paid $20 for each research meeting (total of $40) with the exception of the combined packet for which the participant was paid $30.

A trained TIPS research assistant reviewed the medical charts at each of the six prenatal practices for every program participant and completed a standardized chart review form. Information included recorded blood pressure and weight from every prenatal visit as well as any medications or drugs used during pregnancy.

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Finally, a research assistant or case manager entered all the data collected prenatally into PASW Statistical Software files. Participants who had delivered by March 1, 2010, made up the sample for the current study, and their data were used to analyze the variables of interest.

Secondary Data Preparation Procedure

Being a TIPS research assistant, I had access to the data collected by the program. Having obtained permission from the TIPS director, I proceeded to select the variables needed for analysis in this research study, based on my literature review. These variables were analyzed using PASW Statistics 18 software program.

Instruments

The main predictor in this study was the dichotomized composite variable of Religious Commitment. Its three components (used as continuous variables) – Religious Attendance, Collaborative Coping, and Intrinsic Commitment – were also independently assessed as predictors. The participants' diastolic and systolic blood pressure were the outcome variables. The mediators included in the analyses were health behaviors (smoking and prenatal care use), prenatal stress, and satisfaction with social support. Finally, the mother's age and weight at delivery served as control variables in the analyses.

Smoking and prenatal care use were chosen as the health behavior mediators for this research because previous studies have found that religious people are more likely to abstain from cigarettes than nonreligous people, thereby offering a possible route by which Religious Commitment affects blood pressure (Ellison & Levin, 1998; Gillum, 2005). Adequacy of prenatal care use was incorporated in the analyses as the religiously committed have been found to be more likely to strictly adhere to medical regimens (Masters, 2008), thus reducing the chance of having high blood pressure. The other behavioral high blood pressure risk factors

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discussed in the literature review for this study were not included in the analyzed model. Alcohol consumption was omitted because it is uncommon for pregnant women living in this region to report drinking during pregnancy (Bailey & Daugherty, 2007). This appears to be the case here as well, as of the women participating in the TIPS program, 93.8% reported no alcohol use in the last month at their third trimester interview. Physical activity was not measured as a part of the TIPS program. Eating patterns were not taken into account for this study because it was assumed that eating patterns during pregnancy may be very different from those before pregnancy and may vary from trimester to trimester.

Both self-report instruments and medical chart data were used for analysis in the study. Among the questionnaires the women filled out during the first (or combined) research appointment, was the Background Information form that was of interest for the purposes of this study. The questionnaires pertinent to this research from the third trimester appointment were the Brief Multidimensional Measurement of Religiousness/Spirituality (BMMRS) (Fetzer Institute/NIA, 1999), the Prenatal Psychosocial Profile (PPP) (Curry, Burton, & Fields, 1994), and the Smoking Questionnaire. All of these questionnaires were given to the participants who attended a combined research appointment as well. Each is discussed below and attached in the Appendices section.

Brief Multidimensional Measurement of Religiousness/Spirituality (BMMRS)

The BMMRS (Fetzer Institute/NIA, 1999) was used in this study to measure the predictor, Religious Commitment, which is a composite variable of three of its measures: Intrinsic Religiosity (item #31), Collaborative Coping (item #17), and Religious Attendance (item #5). The order of the items in the BMMRS used for TIPS differed from the order published

by Fetzer Institute/NIA (1999). Item numbers refer to the order of the questions as they were used for this study (see Appendix A).

Intrinsic Religiosity is measured by the statement, "I try hard to carry my religious beliefs over into all my other dealings in life." The responses are scored on a Likert scale from 1 (strongly agree) to 4 (strongly disagree). Based on the 1998 General Social Survey results, the Beliefs and Values scale, which includes the Intrinsic Religiosity item, has adequate internal validity (Chronbach's α=.64), and the Intrinsic Religiosity item had the strongest correlation to the total Beliefs and Values scale among the four items that comprise it (r=.56) (Idler et al., 2003).

Collaborative Coping is evaluated with the statement, "I work together with God as partners." The responses are in the form of a Likert scale, from 1 (a great deal) to 4 (not at all). The 1998 General Social Survey indicated that the Positive Religious Coping scale that includes this item as well as two others had adequate internal validity (Chronbach's α = .81), and that Collaborative Coping was strongly correlated to the Positive Religious Coping scale (r=.75) (Idler et al., 2003).

Religious Attendance is measured by the item that asked, "How often do you go to religious services?" The answers on a Likert scale ranged from 1 (more than 1 time a week) to 6 (never). The scale of Public Religious Activities that is represented by two items, including Religious Attendance, has shown adequate internal validity (Chronbach's α = .82) according to the 1998 General Social Survey. The Religious Attendance item was strongly correlated with the Public Religious Activities scale (r=.70) (Idler et al., 2003).

The scores on each of the BMMRS items were reversed for higher scores to reflect higher Religious Commitment. Each of the three items' scoring was dichotomized in order to arrive at

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high and low Religious Commitment. The scores of 6 ("More than once a week") and 5 ("Once a week") were considered indicative of high commitment on the Church Attendance scale, based on similar criteria used by Koenig et al. (1998) in their blood pressure study. The scores of 4 ("Strongly Agree") and 3 ("Agree") on the Intrinsic Religiosity scale were used to indicate high commitment to faith, being the two positive responses of the scale. Finally, on the Collaborative Coping scale the responses of 4 ("A great deal") and 3 ("Quite a bit") were considered indicative of high commitment.

The items on the three scales were also recoded into one composite dichotomous variable, Religious Commitment. The participants were considered to be high on Religious Commitment when the responses on all three of the scales were the high scores indicated above. This reflects the logic discussed in the previous section of this report (Koenig et al., 2001) and depicted in Figure 3.

Smoking Questionnaire

Smoking was one of the health behaviors hypothesized to mediate the relationship between Religious Commitment and blood pressure. The Smoking Questionnaire was created by the TIPS program director. The questionnaire included questions about the woman's current smoking status, second-hand smoke exposure, attitudes toward the harm done by smoking to the baby and to self, and so forth (Appendices D and E).

The item of interest for this study from the Smoking Questionnaire was the question, "What is your current smoking status?" which was the same for both questionnaires. The responses ranged from 0 ("I have never smoked") to 5 ("I smoke regularly now, about the same amount as before I found out I was pregnant"). In the current study, women who reported never having smoked (the response of 0) or having quit before or after they found out they were

pregnant (responses of 1 and 2 respectively) were defined as current nonsmokers, and the rest of the respondents were considered smokers. Smoking status was thus analyzed as a dichotomous variable.

Kessner Adequacy of Prenatal Care Utilization Index

Adequacy of prenatal care use, another behavioral measure hypothesized to mediate the relationship between Religious Commitment and blood pressure, was measured with the Kessner Adequacy of Prenatal Care Utilization Index (Kessner, Singer, Kalk, & Schlesinger, 1973). The Kessner Index was calculated and recorded by a TIPS case manager or research assistant during prenatal medical chart review. The Kessner Index is considered to be the first, as well as the most widely recognized measure of adequacy of prenatal care use (Bloch, Dawley, & Suplee, 2009; Morris, Egan, Fang, & Campbell, 2007). It is calculated based on the number of prenatal visits and the gestational age at the first visit, and classifies one's prenatal care into Adequate, Intermediate, or Inadequate. In the present study, these classifications were designated the values of "3", "2", and "1", respectively, the higher values thus representing greater prenatal care use. The index calculation directions are attached in Appendix G.

Prenatal Psychosocial Profile (PPP)

The Prenatal Psychosocial Profile (PPP) (Curry et al., 1994) was designed specifically as a psychosocial measure for the time of pregnancy. It includes three sections: a stress scale derived from the Daily Hassles Scale (Kanner, Coyne, Schaefer, & Lazarus, 1981), the Support Behaviors Inventory (Brown, 1986), and a Self-Esteem Scale (Rosenberg, 1965).

The stress scale section of the PPP was used to measure another proposed mediator in the study model, experience of stress during pregnancy. This questionnaire asks about how much stress the respondent is experiencing in 10 areas of life as well as one item on the general sense

of being "overloaded", with answers ranging from 1 ("No stress") to 4 ("Severe stress") on a Likert scale. Curry et al. (1994) reported this instrument's acceptable convergent validity and test-retest reliability, and internal consistency reliabilities at .70 and above.

As mentioned throughout this report, social support may also account for some of the relationship between Religious Commitment and blood pressure. The second section of the PPP, the Support Behaviors Inventory, was used in this study as a measure of social support. It asked the woman to report how satisfied she is with social support both from her partner, if any, and others. Eleven items were used for the partner's and others' support each, resulting in 22 items total. Every item was rated on a Likert scale from 1 (very dissatisfied) to 6 (very satisfied). Brown (1986) reported validity and reliability of this inventory, and Curry et al. (1994) as well as Curry, Burton, and Fields (1998) demonstrated its convergent validity, test-retest reliability, and internal consistency reliabilities of .90 and greater.

The data for partner's support was used for the purpose of analysis in this study. Some women (13.6% of the sample) did not have a partner, and the data from the partner's support half of the Support Behaviors Inventory was missing. In this case, responses from the part measuring others' support were used in the analysis. The two components of the PPP used for this study are included in Appendix F.

Background Information

One of the variables related to blood pressure and important to control for in the study was maternal age (Hixson et al., 1998). It was obtained from the Background Information form that was adapted by the project director from a well-validated tool used in previous studies. This tool collects participants' biographical and demographic information including income, age, and education (see Appendix C).

<u>Medical Charts</u>

One of the most important control variables in this research was weight because of its strong association with blood pressure (Hixson et al., 1998). Women were weighed at delivery, and this value, as recorded by a nurse or doctor in the medical chart, was used for purposes of analysis. For the small percentage of women (5.85%) for whom this value was not located in the delivery chart, the "weight at final prenatal visit/delivery weight" item from the prenatal chart review was used instead.

Finally, for the outcome variables systolic and diastolic blood pressure were considered in separate analyses. Blood pressure was measured by a nurse at the beginning of every prenatal visit and recorded in the woman's medical chart. In order to account for variability in this parameter, an average of the last five blood pressure readings was taken for both systolic and diastolic BP regardless of the corresponding gestational age in order to include those women who delivered prematurely and/or who did not have adequate prenatal care use.

<div align="center"><u>Data Analysis Plan</u></div>

The study sample was compared to the total sample using frequencies and descriptive statistics on several demographic variables. Bivariate correlations among the variables of the model were explored in order to establish which independent variables were related to the dependent variables.

Hierarchical multiple regression was then used to analyze the relationship between the independent variables which were significantly correlated with blood pressure. In the first step of the regression control variables labeled as D2 in the study's mediational model (age and weight of the mother) were entered as direct predictors of blood pressure.

The second step included Religious Commitment. In order to establish which operational definition of this variable predicted lower blood pressure most successfully, four sets of analyses were conducted, each of which included a different measurement of Religious Commitment. This independent variable was measured with the dichotomized composite of Church Attendance, Intrinsic Commitment, and Collaborative Coping, labeled High Religious Commitment, as well as with each of these scales separately. The responses were reverse-coded in each of the BMMRS items for higher values to reflect higher R/S in order to make analyses more easily understood.

Steps three through five included each of the pathways through which Religious Commitment is proposed to predict lower blood pressure. Stress, as the most complex variable, related to health behaviors and social support, was included in the third step of the hierarchical multiple regression. Health behaviors, which included smoking status and Kessner Index, were entered in the fourth step as they have been cited as more predictive of lower blood pressure in literature than social support, which comprised the fifth step of the regression. Values from this final step were used for analysis interpretation and discussion.

Variance for which these five steps of the hierarchical regression did not account is represented by the extraneous variable labeled D1 in the mediational model. This variance includes other potential effects of Religious Commitment on blood pressure as well as the potential direct pathway from the former to the latter. Four multiple regression analyses (one for each operational definition of religious commitment) were conducted both for systolic and for diastolic blood pressure, resulting in a total of eight analyses. In summary, Figure 4 depicts the mediational model used for analysis in this study and includes the instruments that measured each variable.
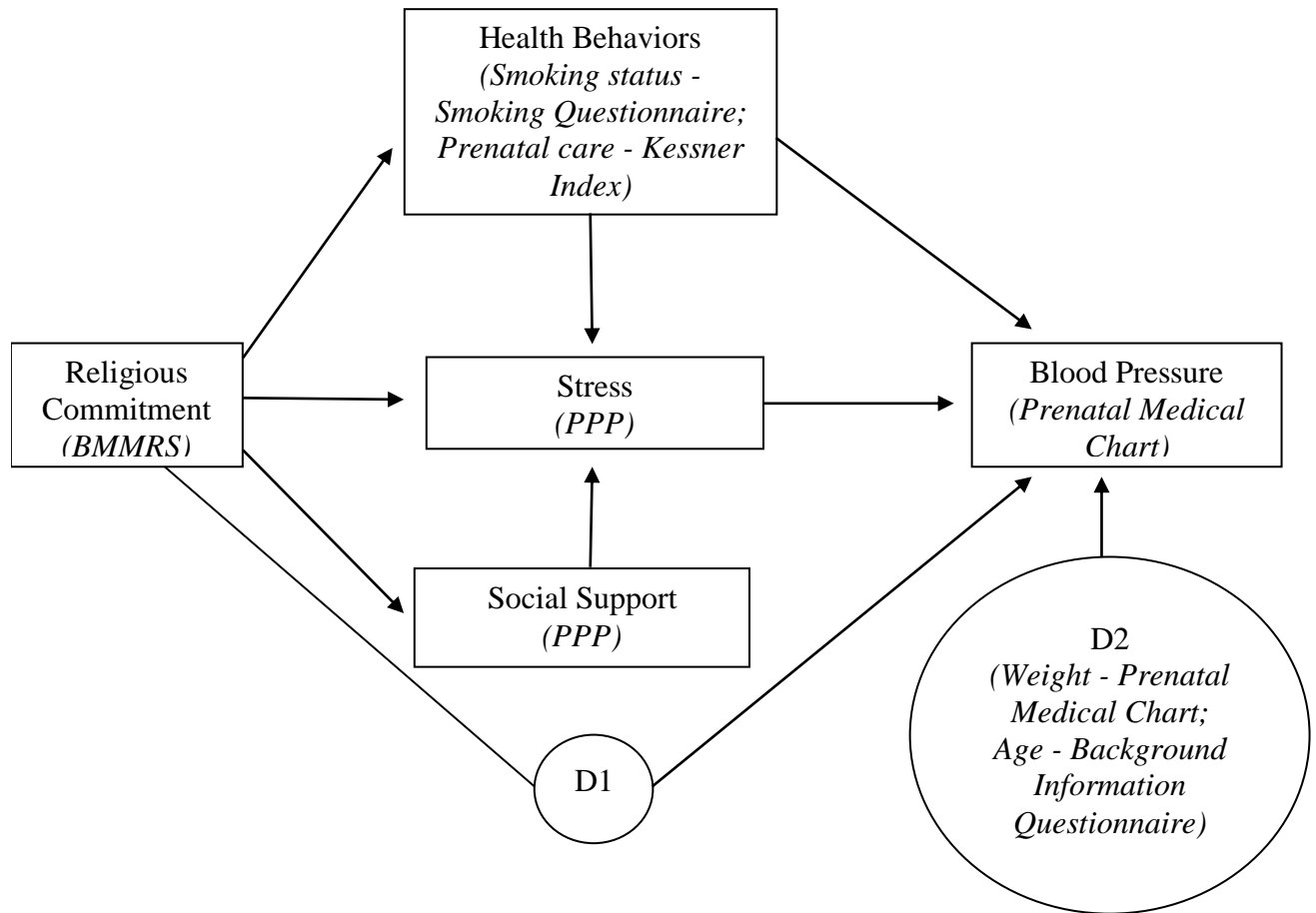
Figure 4. Proposed Relationship of Religious Commitment to Blood Pressure (Including

Instruments)

CHAPTER 4

RESULTS

Before data analysis was conducted, the sample was examined by its distribution on study

variables. The distribution of the sample on the study variables is reflected in Table 2. The

participants' systolic blood pressure had a broad range, with the highest reading of 311.40 mm

Hg for one participant. As the next highest reading was substantially lower (148.60 mm Hg), and

as 311.40 mm Hg was more than three standard deviations above the mean, it was replaced with

the otherwise highest value available (148.60 mm Hg) to avoid skewing data analysis results.

There were also four weight readings (420, 394, 362 and 342 lbs) that were over three standard

deviations above the mean weight. These values were considered outliers and were replaced with

the next highest value of 320.

Table 2

Sample Descriptive Statistics by Study Variables

	Mean (SD) or %	Minimum	Maximum
Mother's weight at delivery (lbs)	191.5 (47.0)	117	420
Average diastolic BP (mm Hg)	74.2 (7.2)	57.2	92.8
Average systolic BP (mm Hg)	121.2 (11.0)	90	311.4
Average stress level	1.8 (0.5)	1	3.2
(4-point scale)			
Average social support level	5.0 (1.0)	1	6
(6-point scale)			
Smoking status			
Smoker (%)	52.3		

Table 2 (continued)

Kessner index

    Adequate (%)   73.5

Religious attendance

    High attendance (%)   16.1

Collaborative coping

    High coping (%)   36.6

Intrinsic motivation

    High intrinsic motivation (%)   62.9

Religious commitment

    High commitment (%)   10.7

Note. Minimum and maximum values are not applicable to variables reflecting sample

categories.

Bivariate correlations were then computed as the first step to data analysis. Correlations

among R/S variables (predictors) were calculated first, and these variables were all significantly

correlated (Table 3).

Table 3

Bivariate Correlations Among Predictor Variables

	Religious Attendance	Collaborative Coping	Intrinsic Orientation
Religious Attendance			
Collaborative Coping	.388**		
Intrinsic Orientation	.455**	.608**	
Religious Commitment	.607**	.370**	.285**

Note. **$p<.01$

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Many of the mediators and control variables were correlated among themselves as well. These correlations are presented in Table 4.

Table 4

Bivariate Correlations Among Mediators and Control Variables

	Smoking status	Stress level	Social support satisfaction	Prenatal care use	Age
Smoking status					
Stress level	.233**				
Social support satisfaction	-.151*	-.396**			
Prenatal care use	-.159*	-.056	-.026		
Age	.052	.141*	-.106	-.043	
Weight at delivery	-.149*	.044	-.053	.126	.080

*Note. *p<.05 **p<.01*

Correlations between the outcome variables were calculated. As might be expected, diastolic and systolic blood pressure were significantly and highly correlated (r=.788, $p<.01$).

It is noteworthy that while the predictor variables were all correlated among themselves (Table 4), there were few significant correlations among R/S variables and the other variables of the study. The bivariate correlations among the R/S variables and mediators and controls are presented in Table 5. Intrinsic Orientation and Religious Commitment were not significantly correlated to any of the mediators or controls. Importantly, none of the predictors were significantly correlated with either of the outcome variables (diastolic and systolic blood pressure).

Table 5

Bivariate Correlations Among Predictors and Mediators, Controls

	Smoking status	Stress level	Social support satisfaction	Prenatal care utilization	Age	Weight at delivery
Religious Attendance	-.155*	-.134	.050	-.143*	.042	-.050
Collaborative Coping	-.162*	-.206**	.041	-.090	-.031	-.007
Intrinsic Orientation	-.116	-.059	-.031	-.118	.119	-.045
Religious Commitment	-.078	-.044	.064	-.055	.049	.026

Note. *p<.05 **p<.01

Although no significant bivariate correlations were observed between the R/S variables and the outcome variables (Table 6), some of the mediators and controls were, in fact, significantly correlated with the outcome variables (Table 7). Specifically, adequacy of prenatal care use was slightly but significantly correlated with diastolic blood pressure in a positive direction, and maternal delivery weight was moderately positively correlated with both outcome variables.

Table 6

Bivariate Correlations Among Outcome and Predictor Variables

	Religious Attendance	Collaborative Coping	Intrinsic Orientation	Religious Commitment
Diastolic blood pressure	-.067	-.112	-.028	.006
Systolic blood pressure	-.014	-.057	.006	.028

Note. None of the correlations were significant.

As some of the predictor and control variables were significantly correlated with blood pressure, and as two of the R/S variables were significantly related to some of the predictor

variables from the study model, multiple regression analyses were conducted as planned, though

under the assumption that there would be no significant prediction of blood pressure changes by

Table 7

Bivariate Correlations Among Outcome Variables and Mediators, Controls

	Smoking status	Stress level	Social support satisfaction	Prenatal care use	Age	Weight at delivery
Diastolic blood pressure	-.113	-.054	.062	.138*	.073	.428**
Systolic blood pressure	-.121	-.113	.029	.134	.013	.468**

Note. *p<.05 **p<.01

R/S variables, as well as by other independent variables that had no significant correlations with

blood pressure. As mentioned previously, eight analyses were conducted: four for each type of

blood pressure, in order to reflect different measurements of R/S.

Firstly, R/S prediction was measured with the Religious Attendance item from the

BMMRS, reverse-scored as previously described (Tables 8 and 9). In the case of diastolic blood

pressure analysis, only the first step containing the extraneous variables of the model (age and

weight), explained a significant amount of variance ($p=.000$). In the case of systolic blood

pressure, the extraneous variables explained a portion of variance ($p=.000$), and step three, which

contained the stress item, explained a small change in variance ($p=.034$) as well. The mother's

weight at delivery was the only variable that significantly predicted increase in diastolic blood

pressure ($t(205) = 6.38$, $p=.000$) as well as in systolic blood pressure ($t(205) = 7.34$, $p=.000$).

Table 8

Multiple Regression Results with Religious Attendance as Predictor, Diastolic BP as Outcome

	B	SE	β	Adjusted R² by step	ΔR² by step
Step 1				.181	.189**
Mother's age	.091	.087	.067		
Mother's weight	.070	.011	.416**		
Step 2				.179	.002
Religious attendance	-.241	.301	-.053		
Step 3				.183	.008
Stress level	-.830	1.064	-.056		
Step 4				.181	.006
Smoking status	-.359	.977	-.025		
Prenatal Care Utilization Adequacy Index	.948	.830	.075		
Step 5				.179	.003
Social support satisfaction	.396	.503	.055		

Note. Coefficients were taken from the last step of the regression. *p<.05 **p<.01

Table 9

Multiple Regression Results with Religious Attendance as Predictor, Systolic BP as Outcome

	B	SE	β	Adjusted R² by step	ΔR² by step
Step 1				.215	.223**
Mother's age	.011	.131	.005		
Mother's weight	.120	.016	.467**		

Table 9 (continued)

Step 2				.211	.000
	Religious attendance	-.001	.448	.000	
Step 3				.225	.017*
	Stress level	-3.029	1.587	-.134+	
Step 4				.222	.004
	Smoking status	-.157	1.458	-.007	
	Prenatal Care Utilization Adequacy Index	1.279	1.238	.066	
Step 5				.218	.000
	Social support satisfaction	-.153	.751	-.014	

Note. Coefficients were taken from the last step of the regression. +*p*<.10 **p*<.05 ****p*<.01

Secondly, the reverse-coded Collaborative Coping item from the BMMRS was used as the predictor (Tables 10 and 11). The mother's weight at delivery significantly predicted an increase in diastolic blood pressure ($t(205) = 6.48$, *p*=.000) and in systolic blood pressure ($t(205) = 7.32$, *p*=.000). Higher levels of stress level were associated with a decrease in systolic blood pressure ($t(205) = -2.10$, *p*=.037). Only the control variables significantly explained a portion of the variance in the model predicting diastolic blood pressure (*p*=.000). Similarly to the previous regression analysis, both extraneous variables and stress accounted for change in explained variance in the systolic blood pressure model (*p*=.000 and *p*=.020 respectively).

Table 10

Multiple Regression Results with Collaborative Coping as Predictor, Diastolic BP as Outcome

		B	SE	β	Adjusted R² by step	ΔR² by step
Step 1					.181	.189**
	Mother's age	.080	.087	.059		
	Mother's weight	.071	.011	.420**		
Step 2					.189	.012
	Collaborative coping	-.905	.474	-.125+		
Step 3					.197	.012
	Stress level	-1.191	1.079	-.079		
Step 4					.194	.006
	Smoking status	-.505	.969	-.035		
	Prenatal Care Utilization Adequacy Index	.833	.822	.066		
Step 5					.192	.002
	Social support satisfaction	.359	.502	.049		

Note. Coefficients were taken from the last step of the regression. +*p*<.10 *p*<.05, **p*<.01

Table 11

Multiple Regression Results with Collaborative Coping as Predictor, Systolic BP as Outcome

		B	SE	β	Adjusted R² by step	ΔR² by step
Step 1					.214	.222**
	Mother's age	.010	.131	.005		
	Mother's weight	.120	.016	.467**		

Table 11 (continued)

Step 2					.213	.003
	Collaborative coping	-.896	.710	-.081		
Step 3					.231	.021*
	Stress level	-3.402	1.617	-.148*		
Step 4					.227	.004
	Smoking status	-.414	1.451	-.019		
	Prenatal Care Utilization Adequacy Index	1.083	1.232	.056		
Step 5					.223	.000
	Social support satisfaction	-.210	.751	-.019		

Note. Coefficients were taken from the last step of the regression. *$p<.05$ **$p<.01$

Thirdly, hierarchical regression analyses were conducted using the reverse-coded

Intrinsic Commitment item from the BMMRS as the predictor variable (Tables 12 and 13).

Consistently with previous findings, as well as with bivariate correlations the mother's weight at

delivery was the only significant predictor of both diastolic and systolic blood pressure ($t(205) =$

6.420, $p=.000$ and $t(205) = 7.412$, $p=.000$ respectively). The first step of the regression

containing the control variables was also the only step which significantly explained a portion of

the change in variance of diastolic blood pressure ($p=.000$). As for systolic blood pressure,

control variables contributed to explained change in variance ($p=.000$), as well as the third step

of the regression represented by the stress item ($p=.036$). This is similar to the findings of the

previous regression analyses.

Table 12

Multiple Regression Results with Intrinsic Orientation as Predictor, Diastolic BP as Outcome

	B	SE	β	Adjusted R² by step	ΔR² by step
Step 1				.183	.191**
Mother's age	.090	.088	.066		
Mother's weight	.071	.011	.421**		
Step 2				.179	.000
Intrinsic orientation	-.081	.484	-.011		
Step 3				.181	.007
Stress level	-.781	1.063	-.053		
Step 4				.179	.006
Smoking status	-.198	.978	-.014		
Prenatal Care Utilization Adequacy Index	1.017	.828	.081		
Step 5				.177	.002
Social support satisfaction	.374	.506	.052		

Note. Coefficients were taken from the last step of the regression. *p<.05, **p<.01

Table 13

Multiple Regression Results with Intrinsic Orientation as Predictor, Systolic BP as Outcome

	B	SE	β	Adjusted R² by step	ΔR² by step
Step 1				.217	.224**
Mother's age	.006	.131	.003		
Mother's weight	.121	.016	.471**		

Table 13 (continued)

Step 2					.214	.001
	Intrinsic orientation	.294	.720	.026		
Step 3					.227	.017*
	Stress level	-3.031	1.583	-.134+		
Step 4					.224	.005
	Smoking status	.013	1.456	.001		
	Prenatal Care Utilization Adequacy Index	1.310	1.233	.068		
Step 5					.220	.000
	Social support satisfaction	-.168	.754	-.015		

Note. Coefficients were taken from the last step of the regression. $+p<.10$ $*p<.05$ $**p<.01$

Fourthly, the dichotomous composite of the three BMMRS items was used as the predictor variable in multiple regression analyses (Tables 14 and 15). Once again, mother's weight was the only variable that significantly predicted increase in diastolic blood pressure ($t(205) = 6.423$, $p=.000$) and in systolic blood pressure ($t(205) = 7.340$, $p=.000$). Step one of hierarchical multiple regression, which includes the mother's weight, was the only step that significantly accounted for explained variance in diastolic blood pressure ($p=.000$). Consistently with previous results, both steps one and three explained a portion of accounted variance ($p=.000$ and $p=.034$, respectively).

Table 14

Multiple Regression Results with Religious Commitment as Predictor, Diastolic BP as Outcome

		B	SE	β	Adjusted R² by step	ΔR² by step
Step 1					.181	.189**
	Mother's age	.088	.088	.065		
	Mother's weight	.071	.011	.419**		
Step 2					.177	.000
	Religious commitment	-.272	1.487	-.012		
Step 3					.179	.006
	Stress level	-.739	1.059	-.050		
Step 4					.178	.007
	Smoking status	-.244	.968	-.017		
	Prenatal Care Utilization Adequacy Index	1.050	.822	.083		
Step 5					.177	.003
	Social support satisfaction	.409	.504	.057		

Note. Coefficients were taken from the last step of the regression. *p<.05, **p<.01

Table 15

Multiple Regression Results with Religious Commitment as Predictor, Systolic BP as Outcome

		B	SE	β	Adjusted R² by step	ΔR² by step
Step 1					.215	.223**
	Mother's age	.010	.130	.005		

Table 15 (continued)

	Mother's weight	.120	.016	.467**		
Step 2					.211	.000
	Religious commitment	.450	2.215	.013		
Step 3					.225	.017*
	Stress level	-.3.023	1.577	-.134+		
Step 4					.222	.005
	Smoking status	-.135	1.442	-.006		
	Prenatal Care Utilization Adequacy Index	1.296	1.224	.067		
Step 5					.218	.000
	Social support satisfaction	-.159	.751	-.014		

Note: coefficients were taken from the last step of the regression. + $p<.10$, *$p<.05$, **$p<.01$

CHAPTER 5

DISCUSSION

The hypothesis of this study was that high Religious Commitment – defined as a combination of high levels of religious attendance, intrinsic religious orientation and collaborative religious coping – would be predictive of lower blood pressure in high-risk pregnancies of rural Southern Appalachia. The pathways through which Religious Commitment was proposed to be related to lower blood pressure were by affecting one's health behaviors, by less exposure to both actual stressors and reducing one's perception of stress, and via increased social support during pregnancy. According to bivariate correlations analysis, none of the religious variables used separately or as a dichotomized composite were related to blood pressure in the study sample, and thus the hypothesis was not supported.

The only variable significantly positively correlated with both types of blood pressure in this study was weight at delivery, which is consistent with previous research (Leeman & Fontaine, 2008). Multiple regression results confirmed a significant predictive effect of weight on both systolic and diastolic blood pressure in this sample.

The participant's prenatal care use was also positively correlated with diastolic blood pressure. While no causality can be inferred from this finding as the multiple regression results did not confirm it, it may be theorized that women who have high blood pressure are more likely to be closely observed by their prenatal health care provider and thus have more prenatal doctor's visits.

Regression analyses included all the variables in the proposed meditational model; however, no significant explained variance or regression coefficients associated with variables other than maternal weight can be assumed to reflect effect on blood pressure. This is based on

the fact that the other variables were not significantly correlated with blood pressure in bivariate analyses.

The findings of this study diverge from the results of other R/S-blood pressure investigations discussed earlier. Hixson et al. (1998) examined the relationship between blood pressure and, among others, the three religious constructs used to define Religious Commitment in this study. Their investigation involved only adult women, though not necessarily pregnant, and the sample was Caucasian and residing in North Carolina, both characteristics consistent with those of the present study sample. These researchers showed a statistically significant negative relationship between both religious coping and intrinsic commitment and systolic and diastolic blood pressure. However, similar to the present study, organized religious activity did not have a significant relationship to blood pressure (Hixson et al., 1998). A study by Buck et al. (2009) also showed no significant relationship between religious attendance and hypertension in their adult sample that, unlike the study under investigation, included both genders.

On the other hand, when Gillum and Ingram (2006) studied religious attendance in a large sample of American adults (older than 20 years), attendance significantly predicted both decreased systolic and diastolic blood pressure. Walsh (1998) found that a composite variable of high religious attendance and high importance of religion (a construct similar to intrinsic commitment) predicted decreased systolic and diastolic blood pressure, though in a sample of immigrants of both genders.

Koenig et al. (1998) explored the effect of both high religious attendance and high private religious activities – the latter uninvestigated in the present study – on diastolic blood pressure in elderly adults. The researchers found that the combination of these two religious variables significantly predicted a lower risk of high blood pressure, especially in African-American and

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younger elderly adults (Koenig et al., 1998). In their experiment on stress reactivity measured by blood pressure Masters et al. (2004) also established that the effect of their religious variable, namely intrinsic commitment, was significant for older (60 years and up), but not younger adults. These results are not easily generalizable to the present study as its sample naturally consisted of younger women (up to 40 years old).

Steffen et al. (2001) studied both genders and found that religious coping significantly predicted lower blood pressure in African-American participants only – a finding similar to Koenig et al.'s (1998), though a different R/S variable was used. There were few African-American and no male participants in the study under investigation, which may account for some difference in results.

While the Tartaro et al. (2005) study had limitations, discussed earlier, the investigators found that among undergraduate students, a composite variable of several BMMRS items predicted decreased blood pressure among males, but higher blood pressure among females. Among the BMMRS items used, however, the only one that coincided with the present study was religious attendance.

In summary, the present study is the first known to the investigator that explored the ability of R/S to predict blood pressure during pregnancy and that defined R/S (specifically designated as Religious Commitment in the study) with the three BMMRS items of Religious Attendance, Collaborative Coping, and Intrinsic Commitment. Due to inconsistencies across methodology, it is difficult to compare or generalize previous literature on R/S-blood pressure. Overall, however, it has largely been proposed by researchers that R/S does in fact predict lower blood pressure. Aside from the possibility of an invalid tool to measure R/S, some reasons why Religious Commitment was not related to blood pressure in this study may be that this effect

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either does not take place during pregnancy, is not observed in the region where the study was conducted, or does not occur in high-risk populations. Also, the effects of some of the previously discussed studies were found in populations of an average older age than the sample under investigation or with ethnic minorities (African-Americans), who did not make up a substantial proportion of the current sample.

It is interesting, on the other hand, that in bivariate analysis Collaborative Coping was related to lower stress levels. This is consistent with Hill and Pargament's (2003) observations. Perhaps, Collaborative Coping does affect stress levels during pregnancy, but this effect may not be observable in blood pressure as many other factors influence the latter. Collaborative Coping was also slightly negatively correlated with smoking. No studies discussing this correlation were found in a literature search using PsycINFO. Research suggests that smoking in general is frequently used as a coping strategy (McEwen, West, & McRobbie, 2008). One may suppose that a religious adherent who practices Collaborative Coping, which may serve as a positive adjustment to stress technique (Koenig et al., 1998; Pargament, 1999), would be less likely to use smoking as a coping strategy. In order to speculate about the effects of Collaborative Coping on stress and smoking, however, more sophisticated study designs and analyses are needed.

Religious Attendance was negatively correlated with smoking as well. Religious attendants have been proposed to have healthier behaviors, including smoking (Idler, 1999a), which may explain this association. Religious Attendance was also slightly negatively correlated with Kessner Prenatal Care Utilization. Religious Attendance has been used in the literature as a reflection of how devoted one is to one's religion/faith (Idler, 1999a) and in such a way to be related to health benefits from following this religion (Hixson et al., 1998; Masters et al., 2004; Masters, 2008). Religious adherents have been hypothesized to strictly adhere to medical

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regimens (Masters, 2008). For this reason, it may appear odd for Religious Attendance to be negatively related to prenatal care adequacy. On the other hand, it may be that women who have more health problems visit their health provider more often, thus making their Kessner index higher than that of healthier women. In other words, the lower Kessner index could be masking better health of the women who are more religiously committed. As in the case of Collaborative Coping discussed above, however, no decisive conclusions about this correlation can be drawn without examining it further.

<u>Study Limitations</u>

With the study results seemingly inconsistent with findings of previous research in the literature, a question may arise of whether there were factors that interfered with the accuracy of study results. The fact that secondary data were used constituted one of the primary study limitations. The variables measured as a part of the TIPS research were not selected with the present study in mind, although they are supported by previous R/S-health studies. Additionally, there was no control over how the outcome variable – blood pressure – was measured. One may suspect that nurses are trained to take blood pressure readings in a uniform fashion; however, this was not monitored or controlled in the study.

As with most studies that involve self-report items, especially as many as were used in the present investigation, there is a chance that participants were untruthful or gave false responses unintentionally, such as when a question is misunderstood or misread. There is also the possibility that participants missed a question, voluntarily or involuntarily. Moreover, many of the cases that had missing data were eliminated prior to statistical analysis. While this is a fairly common practice in research, a question might arise as to the characteristics of participants who chose not to answer questions or skipped them unintentionally. Perhaps, there may be unifying

factors among them, such as carelessness or lower conscientiousness that may have decreased the validity of the findings.

One must also consider that recruitment itself may have presented a bias as many of the participants were likely to have agreed to be a part of the study because of the monetary reward. While this is not a supported assumption, it may be possible that people of a higher socioeconomic status who are less likely to have health problems (Adler & Rehkopf, 2008), may have refused to give their time to participating in research as the material reward was not as appealing to them as to those of a lower socioeconomic standing.

Additionally, as the study sample consisted of pregnant women, their immediate responses to many of the study's questions may differ from their usual tendencies when not pregnant. For example, a woman may report low church attendance because of her pregnancy-related health condition but not because she is not religiously committed. On the other hand, such items as religious attendance were designed to be dispositional measures (Pargament, 1999) and as such are to receive answers about general tendencies. The interpretation of such questions, however, remains up to the participant.

This study's generalizability to pregnant populations is limited. Most women recruited to participate in the TIPS program are considered to be part of an at-risk population, as discussed earlier in this report. They largely have low income: All the prenatal practices where the TIPS program recruits accept patients who are on TennCare, Tennessee's Medicaid program that provides health care insurance to low income households. This sample also has a higher than average rate of drug use and, especially, smoking.

The population also had a large proportion of participants who were high on weight (M=191.5, SD=47). As weight is a strong predictor of blood pressure (Hixson et al., 1998), it is

possible that the effect of the participants' high weight masked the effect that other predictor and mediator variables in the study may have had on blood pressure.

Finally, the results of this study have limited generalizability because of the previously reported high religiosity of this region's population, as discussed earlier. This may contribute to social desirability of high levels of R/S that can interfere with accurate reporting of one's actual R/S beliefs or actions. While this is a possibility, it must be noted that the percentage of the sample that reported high church attendance, for example, is substantially lower than that reported by other samples of the region's population (Clements et al, 2009).

A suggested improvement for this study is to collect primary data designed specifically for the investigation in question, as opposed to relying on secondary data. Another way to increase the study's accuracy is to control the measurement of blood pressure, ensuring its uniformity between participants and prenatal visits.

<div align="center">Study Implications and Future Research</div>

Based on the study's findings, it is not clear whether Religious Commitment, as defined and measured by the investigator, does not have an impact on women's blood pressure during pregnancy, or whether some of the aforementioned limitations interfered with the impact that it has. It is possible that the examined sample has additional medical risks or conditions (such as poverty-related risk factors) that contribute to variance in blood pressure but were not measured.

In addition, pregnancy is a highly stressful time physically and psychologically (Lobel et al., 2008). As stress is related to increased blood pressure (Masters, 2008), it is possible that pregnancy-specific stress affects blood pressure in ways above and beyond other, nonpregnancy specific, stressors. In other words, the time of pregnancy may complicate the use of blood pressure as a health variable in R/S research.

Future investigations of the effects of R/S on health measures such as blood pressure should test the efficacy of the Religious Commitment variable as it was defined in this study. Health measures other than blood pressure, such as cortisol levels or self-reported health, may be used to investigate the impact of Religious Commitment.

It is also important to examine whether this study's results would be replicated in other populations: Other regions of the country and the world, as well as in nonpregnant populations. Primary data collection and experimental studies are especially encouraged as this would address many of the study's limitations. Finally, examining the links between Collaborative Coping and stress and smoking, as well as Religious Attendance and smoking and prenatal care adequacy, present in bivariate analyses of this study, is another area of interest for future investigation in the link between measures of R/S and health-related behaviors.

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APPENDIX A

BMMRS

Affiliation

1. What is your religious preference?
    1. Protestant (denomination: _____)
    2. Catholic
    3. Jewish (specify: ___ Orthodox; ___ Conservative; ___ Reform; ___ None of these)
    4. Muslim
    5. Other (please specify: _____)
    6. No religion

History

2. Did you ever have a religious or spiritual experience that changed your life?
    0. No
    1. Yes (how old were you? _____)

3. Have you ever had a significant gain in your faith?
    0. No
    1. Yes (how old were you? _____)

4. Have you ever had a significant loss in your faith?
    0. No
    1. Yes (how old were you? _____)

Public Practices	More than 1 time/week	Every week	Every month	1-2 times a year	never
5. How often do you go to religious services?	1	2	3	4	5
6. Besides religious services, how often do you take part in other activities at a place of worship?	1	2	3	4	5

Private Practices	More than once a day	Once a day	A few times/week	Once a week	A few times/month	Once a month	Never
7. How often do you pray privately in places other than	1	2	3	4	5	6	7

church/synagogue?

8. Within your religious or spiritual tradition, how often do you meditate?	1	2	3	4	5	6	7
9. How often do you watch or listen to religious programs on TV or radio?	1	2	3	4	5	6	7
10. How often do you read the Bible or other religious books or literature?	1	2	3	4	5	6	7

	At all meals	Once a day	At least once a week	Only on special occasions	Never
11. How often are prayers or grace said before or after meals in our home?	1	2	3	4	5

Support	**A great deal**	**Some**	**A little**	**None**
12. If you were ill, how much would people in your congregation help you out?	1	2	3	4
13. If you had a problem, or were faced with a difficult situation, how much comfort would the people in your congregation be willing to give you?	1	2	3	4

	Very often	**Fairly often**	**Once in a while**	**Never**
14. How often do the people in your congregation make too many demands on you?	1	2	3	4
15. How often are the people in your congregation critical of you and the things you do?	1	2	3	4

Coping	A great deal	Quite a bit	Somewhat	Not at all
16. I think about how my life is part of a larger spiritual force.	1	2	3	4
17. I work together with God as partners.	1	2	3	4
18. I look to God for strength, support, and guidance.	1	2	3	4
19. I feel God is punishing me for my sins or lack of spirituality.	1	2	3	4
20. I wonder whether God has abandoned me.	1	2	3	4
21. I try to make sense of the situation and decide what to do without relying on God.	1	2	3	4

	Very involved	Somewhat involved	Not very involved	Not at all
22. To what extent is your religion involved in understanding or dealing with stressful situations in any way?	1	2	3	4

Beliefs and Values, Spiritual Experience	Strongly Agree	Agree	Disagree	Strongly Disagree
23. I believe in a God who watches over me.	1	2	3	4
24. I feel a deep sense of responsibility for reducing pain and suffering in the world.	1	2	3	4

	Many times a day	Every day	Most days	Some days	Once in a while	Never/ almost never
25. I feel God's presence.	1	2	3	4	5	6
26. I find strength and comfort in my religion.	1	2	3	4	5	6
27. I feel deep inner peace or harmony.	1	2	3	4	5	6

28. I desire to be closer to or in union with God.   1   2   3   4   5   6

29. I feel God's love for me, directly or
    through others.   1   2   3   4   5   6

30. I am spiritually touched by the beauty
    of creation.   1   2   3   4   5   6

Commitment	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
31. I try hard to carry my religious beliefs over into all my other dealings in life.	1	2	3	4

32. During the last year, about how much was the average monthly contribution of your household to your congregation or to religious causes?
    $ _____ per year   OR $ _____ per month

33. In an average week, how many hours do you spend in activities on behalf of your church or activities that you do for religious or spiritual reasons? _____ hours

Forgiveness	**Always/almost always**	**Often**	**Seldom**	**Never**
34. Because of my religious or spiritual beliefs, I have forgiven myself for things that I have done wrong.	1	2	3	4
35. I have forgiven those who hurt me.	1	2	3	4
36. I know that God forgives me.	1	2	3	4

Religious Intensity	**Very**	**Moderately**	**Slightly**	**Not at all**
37. To what extent do you consider yourself a religious person?	1	2	3	4
38. To what extent do you consider yourself a spiritual person?	1	2	3	4

SUMMARY OF THE BMMRS MEASURES NOT INCLUDED IN THE STUDY

Table B1

R/S Dimension	What Measure Assesses	Relation to Health	Relation to Stress	Situational vs. Dispositional	Empirical Support
Daily Spiritual Experiences (Underwood, 1999).	One's general sense of connection to the spiritual realm.	Positive emotions evoked by many of the experiences benefit the immune system.	Positive emotions evoked by many of the experiences act as stress buffers.	Dispositional	Limited
Values; Beliefs (Idler, 1999b, 1999c).	One's view of religion as a source of strength and comfort.	Expectation of positive outcomes and positive interpretation of suffering/death is beneficial to health.	Finding comfort in religion in times of suffering.	Dispositional	Moderate

Table B1 (continued)

Religious/Spiritual History (George, 1999)	Intense religious/spiritual event that may have served as a turning point in life.	Associated with better self-rated health and lower depression, anxiety and alcohol dependence.	Unclear.	Dispositional	Moderate
Forgiveness (Idler, 1999d)	Confession, feeling forgiven by God, by others, by oneself, and forgiving others.	Lowered blood pressure, fewer negative emotions, less depression/anxiety.	Forgiving others in stressful situations predicts lower cortisol levels.	Dispositional	Extensive
Religious Preference (Ellison, 1999)	Religious denomination.	Different religious groups vary in health outcomes based on beliefs and health recommendations.	Unclear.	Dispositional	Limited

APPENDIX C

BACKGROUND INFORMATION FORM

Thank you for agreeing to participate in our study of pregnancy lifestyles. We know your time is valuable, and we appreciate you taking your time to answer our questions today. We understand that some of the questions may make some people uncomfortable, or make them consider not giving truthful information. Please be assured that we will not share what you tell us with anyone, and we are not here to judge you based on any answers you may give us. Our goal is that you be comfortable enough to openly and honestly answer our questions. It is only by everyone giving us honest answers that information from this study might be useful to health care providers working with pregnant patients in the future. Again – thank you!

First you will be asked some basic background information about yourself, your family, and your medical history. After that you will be asked questions about your relationships, your moods, and past and present alcohol and drug use. The tester will read the instructions and questions out loud. You can either answer the tester aloud and let him/her fill out the forms, or if you prefer you can fill our the forms yourself as the tester reads through them. It is your choice – whichever makes you more comfortable. And you can switch options in the middle of the session if you want too. If at any point during the session something is not clear or you need more information, please be sure to ask. We want this to be as quick and as comfortable as possible, so please just ask if there is anything you need.

QUESTION	CODES	RESPONSE
1. How old are you?		
2. How many pregnancies have you had, including this one?		
3. How many live children have you given birth to?		
4. What is your marital status?	1=Married 2=Unmarried, living with partner 3=Divorced 4=Widowed 5=Single, never married	
5. What is your highest level of education?	*Enter number of years* (12=HS grad, add one year for each full year of college; college grad=16; MA=18; PhD/MD=20)	
6. How many people currently live with you?		
7. How many of these people are children under 18?		
8. How many of the children that you live with are YOUR biological children?		

QUESTION	CODES	RESPONSE
9. Circle all people you currently live with.	1=Spouse/partner 2=Own child(ren) 3=Others child(ren) 4=Mother/step-mother 5=Father/step-father 6=Brother(s) 7=Sister(s) 8=Other relative 9=Other non-relative	
10. Do you work outside the home?	0=No 1=Did before pregnancy 2=Part-time 3=Full-time	
11. Do you currently attend school?	0=No 1=Yes, part-time 2=Yes, full-time	
12. If you work outside the home, what do you do? *Write in occupation below and describe duties. Then, in right column, circle the correct code* _____	1=menial, no occupation 2=unskilled worker 3=semiskilled worker 4=skilled manual 5=clerks, sales 6=technicians, semi-professionals 7=small business owner; teacher 8=administrators 9=executives, high level professionals	
13. Does anyone else in your household contribute to the family income?	0=No 1=Yes	
14. If yes to 13, what is that person's highest grade completed?	*Enter number of years* (see #5 above)	
15. If yes to 13, what is that person's occupation? *Write occupation below and describe duties. Then in right column write the correct code (see #12 above)*		

QUESTION	CODES	RESPONSE
16. What was your income last year?	1=<$5000 2=$5,00-9,999 3=$10,000-14,999 4=$15,000-19,999 5=$20,000-29,999 6=$30,000-39,999 7=$40,000-49,999 8=$50,000-59,999 9=$60,000-69,999 10=$70,000-79,999 11=$80,000-89,999 12=$90,000-99,999 13=$100,000+	
17. What was your total household income last year, from all sources?	*Use codes from #16 above*	
18. What type of medical insurance do you have?	0=None 1=Medicaid 2=Private 3=TennCare 4=Medicaid & Private 5=Unknown	
19. What is the primary language spoken in your home?	1=English 2=Spanish 3=Other : _____	
20. What is your current zip code?		
21. How often do you attend church?	0=Never 1=Holidays (few times/year) 2=About once a month 3=A couple times/month 4=Once a week or more	
22. What is the date of your last menstrual period?	Mm/dd/yyyy	
23. What is your estimated due date?	Mm/dd/yyyy	
24. What is your current gestation week?		
25. What was your pre-pregnancy weight?	*Enter in pounds*	
26. What is your current weight? What is your height?	*Enter in pounds* *Enter in feet and inches*	_____lb _____ft _____in
27. Do you have any chronic medical or psychological conditions (developed before pregnancy)? *If yes, describe:*		
28. Do you have any medical or psychological conditions that developed during pregnancy?	*If yes, describe:*	

QUESTION	CODES	RESPONSE
29. Please describe your level of support from other people.	1=I know there is always someone I can turn to if I need practical (i.e. a ride, money, help with a child, etc) or emotional (i.e. someone to talk to, someone to do things with) help. 2=Most of the time there is someone I can turn to if I need practical or emotional help. 3=Only sometimes is there someone I can turn to if I need practical or emotional help. 4=There is hardly ever someone I can turn to if I need practical or emotional help 5=There is never anyone I can turn to if I need practical or emotional help.	
30. How many people do you have that you could turn to for practical or emotional help?	0=None 1=1-2 2=3-5 3=6-10 4=More than 10	
31. Was this pregnancy planned?	0=No 1=Yes	
32. How did you initially feel about your pregnancy?	1=Very upset and scared 2=Upset, but it wasn't the end of the world 3=Ambivalent (upset/scared and excited both) 4=Happy 5=Overjoyed and excited	
33. How do you feel about your pregnancy now?	*Use codes in #32 above*	

PREGNANCY SMOKING INFORMATION QUESTIONNAIRE
FOR SMOKERS

Current Smoking Status
1. Which statement best describes you now?
      5 = I smoke regularly now – about the same amount as BEFORE I found out I was pregnant
      4 = I smoke regularly now, but more than BEFORE I found out I was pregnant
      3 = I smoke some now, but have cut down SINCE I got pregnant
      2 = I stopped smoking AFTER I found out I was pregnant, and I am not smoking now
      1 = I stopped smoking BEFORE I found out I was pregnant, and I am not smoking now
      0 = I have NEVER smoked

2. Considering smoking from people *other than yourself*, about how many cigarettes per day are you exposed to?
      _____ cigarettes OR _____ packs
      Less than 1 cigarette/day? _____

3. During the three months before you found out you were pregnant, about how many cigarettes did you smoke per day? (a pack has 20 cigarettes)
      _____ cigarettes OR _____ packs
      Less than 1 cigarette/day? _____
      Didn't smoke? _____
      Don't know? _____

4. During the first 3 months of your pregnancy, about how many cigarettes did you smoke per day?
      _____ cigarettes OR _____ packs
      Less than 1 cigarette/day? _____
      Didn't smoke? _____
      Don't know? _____

5. During the second 3 months of your pregnancy, about how many cigarettes did you smoke per day? (leave blank if you are still in your first three months)
      _____ cigarettes OR _____ packs
      Less than 1 cigarette/day? _____
      Didn't smoke? _____
      Don't know? _____

6. During the past 7 days, how many cigarettes or packs of cigarettes did you smoke on an average day? (A pack has 20 cigarettes)

_____ cigarettes OR _____ packs
Less than 1 cigarette/day? _____
Didn't smoke? _____
Don't know? _____

7. Have you had a cigarette, even a puff, within the last 30 days?
      1 = Yes   0 = No

8. Have you had a cigarette, even a puff, within the last 7 days?
      1 = Yes   0 = No

9. How soon after you wake up do you usually smoke your first cigarette?
      1 = Immediately (_____ minutes)
      2 = No usual time/time varies

10. When did you smoke your last cigarette?
      _____/_____/_____ (date)

11. Since you have been pregnant, have you noticed any difference in how tobacco smoke tastes or
    smells?
      0 = No, it tastes and smells the same
      1 = Yes, it tastes and smells better
      2 = Yes, it tastes and smells worse
      3 = Yes, it tastes and smells so bad I have reduced, quit, and/or avoided others who are
          smoking

12. Right now, today, which of the following best describes how you feel about quitting?
      0 = I am not currently considering quitting
      1 = I have been thinking about quitting, but haven't made any definite plans yet
      2 = I want to quit and have begun making plans to quit
      3 = I am currently attempting to quit
      4 = I have quit, and am working toward being permanently smoke free

13. If you are considering or attempting to quit smoking (or have already quit), what are your main reasons?

14. Do you want to quit smoking?
      0 = No, not at all
      1 = A little
      2 = Somewhat
      3 = Yes, a lot

15. How confident are you that you would be able to quit smoking in the next 30 days if you tried?

1	2	3	4	5	6	7
Not at all			Somewhat			Very

16. Do you believe that smoking during pregnancy harms the unborn baby?
      0 = No, not at all
      1 = Somewhat
      2 = Yes, a great deal

17. If somewhat or yes above, how could the baby be harmed?

18. Do you believe that smoking harms your health?
      0 = No, not at all
      1 = Somewhat
      2 = Yes, a great deal

19. If somewhat or yes above, how is it harmful to your health?

20. What do you see as the biggest barriers to your quitting smoking (i.e. what would be most likely to keep you from being able to quit)?

21. How many times have you quit smoking for more than 24 hours since you found out you were
    pregnant?
        _____ times (enter 0 if have not gone a day without a cigarette)

22. What is the longest period of time you have gone without smoking since you became pregnant?
        _____ hours OR _____ days

23. If you have attempted to quit or cut down on your smoking, how supportive would you say your family and friends have been about your attempts to quit smoking?

5 = Very supportive – they will do whatever they can to help me stop smoking
4 = Somewhat supportive – they want me to quit smoking, but I am pretty much on my own to make it happen
3 = Neutral – they do not care if I quit smoking or not
2 = Not supportive – they don't think I need to quit smoking
1 = Support varies – some are supportive, some are not

24. Does your partner smoke?

0 = No   1 = Yes   2 = Do not currently have a partner

25. Do you have regular (daily or near daily) contact with someone who smokes?

1 = Yes   0 = No

26. Do you live with someone who smokes?

1 = Yes   0 = No

27. How many smokers do you live with?

_____

28. Have you changed your exposure to others smoking around you?

3 = NO, I do not and have never let anyone smoke around me
2 = YES, I used to let other people smoke around me, but now that I am pregnant I always
         stay away from people who are smoking
1 = YES, I used to let other people smoke around me, but have REDUCED how much of
         other peoples smoke I am exposed to since I have become pregnant
0 = NO, I have let people smoke around me, and have not changed this since I have become
         pregnant

29. If you have attempted to quit or cut down on your smoking, which of the following methods have you tried? (check all that apply)

_____ quitting "cold turkey" (i.e. just all of a sudden stopping)
_____ quitting gradually (reducing the amount you smoke each day)
_____ a nicotine patch or gum
_____ self-help pamphlets or books
_____ a "buddy system" (i.e. quitting together with someone)
_____ attending a smoking cessation class (how many sessions attended? _____)

30. Which of the above methods that you checked did you find most helpful to quitting or cutting down?

_____ quitting "cold turkey" (i.e. just all of a sudden stopping)
_____ quitting gradually (reducing the amount you smoke each day)
_____ a nicotine patch or gum
_____ self-help pamphlets or books
_____ a "buddy system" (i.e. quitting together with someone)
_____ attending a smoking cessation class

31. Which was the second most helpful?
    _____ quitting "cold turkey" (i.e. just all of a sudden stopping)
    _____ quitting gradually (reducing the amount you smoke each day)
    _____ a nicotine patch or gum
    _____ self-help pamphlets or books
    _____ a "buddy system" (i.e. quitting together with someone)
    _____ attending a smoking cessation class

32. If you attended a smoking cessation class, did a family member or friend attend with you?
    1 = Yes   0 = No

33. If you have cut down on smoking, or quit smoking altogether, how useful were the smoking cessation classes for you?

    3 = Very useful – I would not have been able to cut down/quit without them
    2 = Somewhat useful – they were part of what made it possible for me to cut down/quit
    1 = Not very useful – there was little or nothing I took from the classes that was useful in my being able to cut down/quit

34. Has your physician talked to you about other people smoking around you while you are pregnant?

    1 = Yes   0 = No

35. If yes, how often has he or she talked with you about others smoking around you?
    4 = at every prenatal visit
    3 = at most prenatal visits
    2 = at some prenatal visits
    1 = only once
    0 = never

36. If your physician has talked to you about others smoking around you, what did he or she say?

37. How did you respond?

38. Has your physician talked to you about **your** smoking at your prenatal visits?
     1 = Yes   0 = No

39. If yes, how often has he or she talked with you about quitting?
     4 = at every prenatal visit
     3 = at most prenatal visits
     2 = at some prenatal visits
     1 = only once
     0 = never

40. If your physician has talked to you about quitting, what did he or she say?

41. How did you respond?

42. How did you feel about your physician talking to you about smoking?

43. Did you find his/her advice helpful? If so, what did you find helpful?

44. What did you find not helpful or that bothered you?

45. Did what he/she said contribute to you reducing or quitting smoking?

46. What additionally could your physician do or say that might help you stop smoking?

47. Since you have been pregnant, have you used any medication (either prescription or over the counter) to help you stop smoking?

    1 = Yes   (specify: _____)   0 = No

48. If you have used medication to stop smoking, when did you use it?
    From: ____/____/____   To: ____/____/____

49. If you have used medication to stop smoking, was it recommended by your physician?
    1 = Yes   0 = No

50. Which of the following best describes your exposure to other people smoking:

    0 = I do not have regular contact with anyone who smokes
    1 = I have regular contact (but do not live) with other people who smoke, but they do not smoke around me when I am with them
    2 = I have regular contact (but do not live) with other people who smoke, and they do often smoke when I am with them
    3= I live with at least 1 smoker, but they do not smoke when I am around
    4= I live with at least 1 smoker, and they do often smoke when I am around

51. During the past 30 days, how many cigarettes did you smoke on an average day?
_____

52. During the past 24 hours, how many cigarettes did you smoke?_____

53. How long has it been since your last cigarette? (time, if in the past 24 hours)_____

54. How old were you when you had your first cigarette? _____

55. For how many years have you have been smoking regularly? _____

56. Smokerlyzer reading CO (ppm)_____

57. Smokerlyzer reading COHb (%)_____

58. Comments: _____

PREGNANCY SMOKING INFORMATION QUESTIONNAIRE
FOR NONSMOKERS

1. Which statement best describes you now?

      5 = I smoke regularly now – about the same amount as BEFORE I found out I was
          pregnant
      4 = I smoke regularly now, but more than BEFORE I found out I was pregnant
      3 = I smoke some now, but have cut down SINCE I got pregnant
      2 = I stopped smoking AFTER I found out I was pregnant, and I am not smoking now
      1 = I stopped smoking BEFORE I found out I was pregnant, and I am not smoking now
      0 = I have NEVER smoked

2. Does your partner smoke?

      0 = No   1 = Yes   2 = Do not currently have a partner

3. Which of the following best describes your exposure to other people smoking:

      0 = I do not have regular contact with anyone who smokes
      1 = I have regular contact (but do not live) with other people who smoke, but they do not
      smoke around me when I am with them
      2 = I have regular contact (but do not live) with other people who smoke, and they do
      often smoke when I am with them
      3= I live with at least 1 smoker, but they do not smoke when I am around
      4= I live with at least 1 smoker, and they do often smoke when I am around

4. Have you changed your exposure to others smoking around you?

      3 = NO, I do not and have never let anyone smoke around me
      2 = YES, I used to let other people smoke around me, but now that I am pregnant I
          always stay away from people who are smoking
      1 = YES, I used to let other people smoke around me, but have REDUCED how much of
          other peoples smoke I am exposed to since I have become pregnant
      0 = NO, I have let people smoke around me, and have not changed this since I have
          become pregnant

5. Do you believe that smoking during pregnancy harms the unborn baby?

        0= No, not at all
        1= somewhat
        2= yes, a great deal

6. If somewhat or yes above, how could the baby be harmed?

7. Do you believe that smoking harms your health?

        0= No, not at all
        1= somewhat
        2= yes, a great deal

8. If somewhat or yes above, how is it harmful to your health?

9. If you ever smoked, when did you smoke your last cigarette? Day___ Month ___ Year_____

10. Smokerlyzer reading CO (ppm)_____

11. Smokerlyzer reading COHb (%)_____

12. Comments: _____

PRENATAL PSYCHOSOCIAL PROFILE

Below is a list of factors that might be stressful in your life right now. Please indicate the level of stress or hassle you feel each of the following causes you.

	No Stress 1	**Some Stress 2**	**Moderate Stress 3**	**Severe Stress 4**
1. Financial worries (e.g. food, shelter, health care, transportation)	1	2	3	4
2. Other money worries (bills, etc)	1	2	3	4
3. Problems related to family (partner, children, etc)	1	2	3	4
4. Having to move, either recently or in the future	1	2	3	4
5. Recent loss of a loved one	1	2	3	4
6. Current pregnancy	1	2	3	4
7. Current abuse (sexual, emotional, physical)	1	2	3	4
8. Problems with alcohol and/or drugs	1	2	3	4
9. Work problems (e.g. being laid off, trouble with boss/co-workers, etc.)	1	2	3	4
10. Problems related to friends	1	2	3	4
11. Feeling generally "overloaded"	1	2	3	4

The next set of questions asks how satisfied you are with the amount of support you receive from your partner and/or other people.

First of all, do you have a partner?
    _____   **No**   **(answer only about support from others)**
    _____   **Yes**

Below is a list of statements describing types of support. On a scale of 1 to 6, with 1 being *very dissatisfied* **and 6 being** *very satisfied***, indicate how satisfied you are with the support you receive from your partner and/or other people.**

	Partner		Other People	
	Very Dissatisfied	Very Satisfied	Very Dissatisfied	Very Satisfied
1. Shares similar experiences with me	1 2 3	4 5 6	1 2 3	4 5 6
2. Helps keep up my morale	1 2 3	4 5 6	1 2 3	4 5 6
3. Helps me out when I am in a pinch	1 2 3	4 5 6	1 2 3	4 5 6
4. Shows interest in my daily activities and problems	1 2 3	4 5 6	1 2 3	4 5 6
5. Goes out of his/her way to do special or thoughtful things for me	1 2 3	4 5 6	1 2 3	4 5 6
6. Allows me to talk about things that are very personal and private	1 2 3	4 5 6	1 2 3	4 5 6
7. Lets me know I am appreciated for the things I do for him/her	1 2 3	4 5 6	1 2 3	4 5 6
8. Tolerates my ups and downs and unusual behaviors	1 2 3	4 5 6	1 2 3	4 5 6
9. Takes me seriously when I have concerns	1 2 3	4 5 6	1 2 3	4 5 6
10. Says things that make my situation clearer and easier to understand	1 2 3	4 5 6	1 2 3	4 5 6
11. Lets me know that he/she will be around if I need assistance	1 2 3	4 5 6	1 2 3	4 5 6

APPENDIX G

KESSNER ADEQUACY OF PRENATAL CARE UTILIZATION INDEX

Medical Care Index	Gestation (Weeks)	Number of Prenatal Visits
Adequate		
	13 or less	and 1 or more or not stated
	14-17	and 2 or more
	18-21	and 3 or more
	22-25	and 4 or more
	26-29	and 5 or more
	30-31	and 6 or more
	32-33	and 7 or more
	34-35	and 8 or more
	36 or more	and 9 or more
Inadequate		
	14-21	and 0 or not stated
	22-29	and 1 or less or not stated
	30-31	and 2 or less or not stated
	32-33	and 3 or less or not stated
	34 or more	and 4 or less or not stated
Intermediate	All other combinations	

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