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Akinwande Benka-Coker April 22, 2011

Religiosity as a Predictor for Individual Contraceptive Behavior among U.S. Women

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Masters of Public Health

Epidemiology

_____ [Chair's signature]

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Epidemiology

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Abstract

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The socioeconomic and public health significance of family planning and contraception are noted as an important achievement in 20th century public health. However, almost half of the all pregnancies in the U.S. are unplanned. Certain factors have been identified as determinants for effective contraceptive behavior, amongst which religiosity is believed to play a significant role. To understand this relationship, the 2006 National Survey of Family Growth (NSFG) data is used to predict the relationship between religiosity and contraceptive use and choice.

This study employs complex survey methods to test two separate logistic models, controlling for demographic and socioeconomic covariates, with contraceptive use and choice (condoms versus pills) as the outcome variables and in both cases, a composite measure of religiosity (religiosity index) as the primary exposure.

Results indicate that an estimated 38.2 million women of reproductive age, at risk for unintended pregnancy, were contracepting, with pills, sterilization and condoms the main methods being used. Multivariate modeling revealed that higher religiosity was associated with less contraception, but this relationship was non-significant. There is also no significant association between religiosity and the method choice (condoms versus pills).Women's marital status and parity were also associated with the use of contraceptives.

Among women at risk of unintended pregnancy, religiosity levels do not significantly predict the contraceptive behavior (use and choice) of these women.

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Acknowledgments

I would like to acknowledge all who helped me accomplish writing this thesis.

First, I would like to acknowledge the NSFG and NCHS for conducting research work. Particularly I would like to thank all the personnel involved and the individuals and organization responsible for the funding of their project.

I would also like to thank Emory University, the Epidemiology Department, and especially Dr. Kramer for his immense assistance with my thesis and for his inspiration and guidance.

Special thanks to Jena Black for her family-like support and guidance through my years at Rollins.

Finally, I would like to thank my family and friends who have supported and encouraged me through my academic and non-academic pursuits, and will continue to show compassion and patience no matter what I do.

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INTRODUCTION

The benefits of effective contraception are frequently listed in multiple literature sources. The socioeconomic and public health significance of family planning and contraception are recognized as a major achievements in 20th century public health [1]. Recent data indicate however that almost half of all pregnancies in the U.S. are unplanned; the U.S. rates of unintended pregnancy and abortions dwarf rates in other developed nations [2]. In this light, it has become apparent that the increasing the use of more and effective contraception methods could sustain the gains of contraception and family planning [3, 4].

An 'unintended pregnancy' refers to and includes pregnancies unwanted by a couple and those that were mistimed [5]. There is an extensive spectrum of problems linked with unintended pregnancy; specifically it is known to directly increase maternal mortality through factors such as pregnancy complications and unsafe abortions, as well as increasing maternal morbidity by resulting conditions like postpartum depression and other psychiatric and psychological disorders [6, 7]. The worldwide burden of maternal deaths attributed to failure or lack of contraceptive services is an estimated 200,000. In addition to maternal health, effective contraception is believed to have played an important role in reducing infant mortality by almost 50% in the decades since its availability [6, 7].

In addition to preventing pregnancy, the male condom also significantly reduces transmission of sexually transmitted infections, and has especially been important in limiting spread of HIV infection [8]. Similarly several data show how effective contraceptive behavior plays a major role in reducing the extensive health costs linked to these pregnancies and births and

associated morbidity; these economic benefits are especially pronounced in unwed and teenage mothers [9-11].

In the last 2 decades, despite the increase in knowledge about contraceptives, and the availability of safe and effective contraceptive options worldwide, th[e] [d]ocumented achievements of effective contraception have stalled and in fact reversed, with the recorded increase in unintended pregnancy in the United States, especially associated among non-contraceptor women [10, 12]. The problem however is not limited to non-contraceptors; only about 7.3% (4.5 million) of women at risk of unintended pregnancy are non-contraceptors [13]. Brown and Eisenberg estimate that on average the probability of an unintended pregnancy in 12 months of contraceptive use in the United States is as high as 12% [11]. This raises questions about consistent and correct contraceptive use and hence it is important to assess factors which may influence use and failure of contraceptives, especially in women given that most accessible contraceptive methods are made for female use [14]. Understanding any relationships between contraceptive method use and choice and factors that determine outcomes like unintended pregnancy and STIs is essential to reducing the burden of unintended pregnancy and morbidity from sexually transmitted infections among American women [15].

Several factors have been reported to influence choice and use of contraceptives including personal choice, perceptions of efficacy, personal risk, access, age, cost, gender, education, ethnicity, marital status, current number of children, sexual orientation, the pattern of sexual activity and level of cooperation between partners [14].

Among this extensive list, several determinants of contraceptive behavior perceived as important have been examined including a number of risk and protective factors [12, 16, 17]. Key factors such as access to contraceptive services, fear of sexually transmitted infections (STI), reproductive health education, socioeconomic status, race and maternal educational status have all been explored [10, 12, 16, 17].

One hypothesis that has been consistently nurtured is that religiosity can be associated with an individual's contraceptive behavior. Religiosity in this sense refers to the intensity of religious beliefs and participation [18]. The concepts in which religiosity is embedded in are widely perceived to have an influence in health and human behavior [19, 20]. Several studies have suggested varying relationships between religiosity and a number of contraceptive and sexual behavior variables including outcomes such as greater abstinence, delayed sexual debut and contraceptive use and method choice; the problems with some of these studies have however often been methodological [12, 16]. Many gaps exist in the description of the religiosity and contraceptive behavior variables, and the role of religiosity in individual contraceptive behavior [12, 16, 21].

The purpose of this present study is to use the 2006-2008 National Survey of Family Growth (NSFG) data to identify any significant associations between religiosity and individual contraceptive behavior (use and choice) among U.S. women, essentially exploring the hypothesis that religiosity may predict individual contraceptive behavior in these women.

Hypotheses

This study aims to address the following hypotheses:

1. Among sexually active women at risk for unintended pregnancy, higher religiosity is independently associated with less use of contraception.
2. The pattern of choice of contraceptive methods (between condoms and oral contraceptive pills) among U.S. women is associated with the level of religiosity. Higher religiosity is associated with choosing condoms rather than pills.

BACKGROUND

Introduction

Research in the area of contraceptive behavior and religious beliefs and attitudes spans several spheres of expertise including but not limited to behavioral sciences, infectious disease, reproductive medicine, social epidemiology and even psychology. Ultimately, public health practitioners are working to determine factors that influence population's decisions on healthy behavior patterns such as effective contraception. Previous research has been only able to detect minimally significant and often contradicting predictors and non-predictors of efficient contraceptive behavior in women of reproductive age. Considerable gaps still exist in this important subject that affects women across racial, cultural and socio-economic backgrounds.

Risk and Protective Factors Associated with Contraceptive Behavior

A variety of factors have been identified by researchers to influence contraceptive behavior, while others are hypothesized to be either protective or risk factors that determine effective contraception. Most women (and couples) determine use and choice of contraception based on a relative cost (risk) and benefit model, governed by these factors [15, 17]. Some of the more commonly researched factors include race and ethnicity, socio-economic status and sexual behavior [16, 17].

Racial and ethnic differences have been associated with contraceptive behavior. Studies show that despite the widespread use of contraceptives among U.S. women of reproductive age, African American and Hispanic women have a lower rate of contraceptive use [13]. The rates of

STIs and importantly unintended pregnancies illustrate the disparities in effective contraceptive use among the African American and Hispanic women [1, 22, 23]. Finer *et al.* showed in their study that there are associated higher rates of unintended pregnancies, unintended births and abortions in these groups of women [22].

A low socioeconomic level and lack of education has been linked to risky sexual behaviors as well as poor contraception by several studies [24, 25]. Women who attended college were likely to use contraceptives [24]; those in the lower socioeconomic class at a higher risk for STIs and unintended pregnancy due to relatively poorer contraceptive behavior [25, 26].

Sexual behavior was another important factor highlighted by researchers. Cavazos-Rehga *et al*. report that young women with multiple partners (greater than 6) tended to use contraceptive measures that were less reliable like withdrawal, and to a lesser extent use measures other than condoms and other barrier methods [27]. Similarly, Tanfer and Cubbins report results that indicate that an increase in coital frequency was associated with an increase in pill or IUDs as a choice of contraception [17].

Religious affiliation, religiosity and spirituality have also been hypothesized as determinants and explored.

Religion, Religious affiliation and Religiosity

Religion has been identified as an important force in shaping social life, and is an evidently strong influence on values and attitudes that influence behavioral aspects in daily living [28, 29]. Religion and religious involvement are related to a variety of sexual and reproductive

behaviors among American women [28]. For instance, religion has been associated with timing of first sexual intercourse [28, 30]; greater frequency of attendance at religious services is associated with a reduced likelihood of intercourse among female adolescents [12, 28, 31]; number of sexual partners [32, 33]; and several authors also link religiosity with family size, and contraceptive use [30, 32, 33].

Several studies have posited hypotheses about the nature of the relationship between religion and fertility and contraceptive practices with 4 specific hypotheses standing out [30, 34-38].

The “characteristics” hypothesis claims that differences in behavior among religious or ethnic groups are a function of the different social and economic characteristics of the groups; hence no systematic behavioral differences remain once there are controls for socio-economic factors known to be important in determining contraceptive behavior. The “particularistic” hypothesis seeks to illustrate this relationship through the theological differences in existence between religious doctrines, assuming that some doctrines are more pronatalist than others. In that sense, the more religious portions of each group subsist on the particular teachings of their doctrines. The “cultural hypothesis” is somewhat similar to the particularized theory, differing in the sense that the group norms that affect fertility and contraceptive behavior are driven through the cultural beliefs of the social community and not necessarily driven by theological factors of the religious doctrine. The “minority-group status” hypothesis basically states that the fertility intentions of the members in a minority group are unrelated to their religious affiliation, but are based on the desire and opportunity of the group to maximize its security or social and economic mobility or both.

These hypotheses, extensively described in other literature [34, 36, 37, 39], all highlight the importance of religious characteristics in human society and behavior.

Religious affiliation and religiosity are two of the most important characteristics of religion [21, 39, 40]. The relationship between religious affiliation or group and contraceptive behavior has also been examined in detail by several researchers. Most researchers and scholars maintain that despite the increasing secularization in the U.S., there is still some influence on contraceptive behavior inferred by an individual's religious affiliation [36, 41]. However, most recent articles indicate that the influence tends to disappear once sociodemographic characteristics are controlled for [28, 37, 42]. Ultimately, there has been a trend towards a general pattern in fertility levels and expected family size between religious groups in the last two decades [36]. The contraceptive paths towards achieving these levels have however been different among these religious groups. Generally, Protestant and Catholics differ in their contraceptive styles; Protestant levels of female sterilization are higher than that of Catholics, and Catholic levels of oral contraceptive pill and condom use are higher than those of Protestant women [36].

Another important aspect of religion is religiosity. It is widely considered as the intensity of religious beliefs and participation [18, 43]. The complexity of religiosity is underscored by the difficulties in standard and uniform utilization in research. The terms religiosity, religiousness, religious involvement and spirituality are often used interchangeably, indicating differing views by scholars and researchers on theoretical and operational definitions of these terms [21]. Different formats have been used to explain religiosity as a component variable in research. Koenig *et al.* in *Religion and Health (2001)* approach religiosity as a three-dimensional construct

including subjective, non-organizational and organizational components in their definition of religiosity [19]. Subjective religiosity here refers to an internal (individualistic) gauge of the importance of religion. The more objective components are non-organizational and organizational. Non-organizational religiosity refers to the private expressions of religion and faith, including personal activities like prayer and meditation. Organizational religiosity pertains to actions that involve participation or interaction in religious services, for example, frequency of attendance at place of worship [19]. In this vein, most researchers usually describe religiosity as either a single-item measure or as a multi-dimensional measure [16, 19, 21].

Single measures often used to define religiosity include Attendance/Participation in religious activities, religious importance and religious denomination/affiliation [21]. For example in a 2008 article by Hayford and Morgan, the authors examine the relationship between religiosity and fertility options using the importance of religion in daily life as their single measure of religiosity [44]. Similarly Venkat *et al.* assessed the importance of religiosity in making contraceptive choices evaluating religiosity by frequency of visits to a woman's place of worship [45].

Multidimensional measures are usually employed by researchers either as uncombined solitary variables or as a composite religiosity variable.

Several researchers choose utilize various single measures (uncombined) to independently assess relationships with other variables [33, 34, 39, 46-49]. Haglund and Fehring, for example, examined the association of religiosity, sexual education and family structure with risky sexual behaviors among adolescents using three religiosity variables – importance of religion, frequency of attendance at religious services and religious attitudes on human sexuality [46].

Other researchers prefer to employ religiosity as a composite variable of combined measures [16, 26, 32, 38, 50]. Different composition methods were used. For example, while Gold *et al.* created their overall religiosity index by summing up values from responses to religiosity questions and categorizing them into tertiles [16], Strayhorn and Strayhorn employed a method of creating index scores by averaging the percents of respondents endorsing the most "religious" answers across several (8) religiosity questions [50].

Though the validity of the description ultimately depends on the message being conveyed by the author/scholar, evidence of reliability is a good measure of the quality of a study. Lynn's review of associations among religiosity and health attitudes and behaviors (2009) indicates that a large proportion of articles using single-measures of religiosity fail to provide evidence for the reliability of their measures [21]; several researchers point out that a multi-dimensional approach is more reliable at capturing a more distinct and direct effect based on the spheres of the religiosity construct [16, 21]. Gold *et al*., Cerqueira-Santos *et al*., and Landor *et al*. all reported good internal reliability with the use of religiosity as a composite multi-dimensional variable (Cronbach's alpha - 0.65, 0.87 and 0.84 respectively) [16, 26, 32]. Nevertheless, researchers like Davidson *et al.* argue that single-item measures of religiosity are equally adequate and less confusing to respondents than multiple item scales [48].

Religiosity and Contraceptive Use

These descriptions above give an insight as to why assessing this relationship is relevant. The characteristics of religiosity are a prominent and complex part of interplaying features of human culture and behavior [40]. According to Kramer *et al*., components of religion and religiosity largely influence public opinion, personal behavior and public policy with regard to a variety of issues concerning reproductive health, therefore affecting individual sexual and reproductive choices such as views on the relationship between sex, childbearing and marriage, defined by contraceptive use and choice [12].

Broadly speaking, most studies have historically alluded to religiosity as a protective factor for risky sexual behavior, particularly associations with delay of coitarche, decreased frequency of sexual activities and a lower number of sexual partners [16, 47, 49, 51-55]. However when it comes to the relationship between religiosity and contraceptive use, there is less information available, and results have been more or less spread across an array of negative [31, 41, 50, 56], positive [28, 30, 32, 33, 48, 57], or no association [12, 16, 26, 44, 47, 49, 53, 58-60].

Negative Association

Several researchers have demonstrated that a higher level of religiosity is associated with reduced contraceptive use.

Cooksey *et al*. examined the impact of religion on intercourse risk and contraceptive use among young women using data from NSFG Cycle III and IV [56]. Their results indicate that about 58% of eligible adolescents used contraceptives at first sexual intercourse. Cooksey and colleagues also ascertain that the more fundamentalist groups (by race) delayed sexual intercourse, and

were also significantly less likely to have used contraceptives at coitarche (White Catholics, Black Protestants – $p < 0.001$). These results are similar to those indicated by Brewster *et al.* [41]. However both studies do not show evaluations pertaining to the adolescent's current use of contraception.

In addition, Zaleski and Schiaffino reported a similar association in their study on the relationship between religiosity and sexual activity and condom use [31]. Using a Religious Orientation Scale (Allport and Ross, 1967) to assess the degree of intrinsic and extrinsic religiosity, they state that higher rates of both religiosity measures were associated with less condom use controlling for gender($F = 8.55, 7.35$ respectively; $p<0.01$ for both associations). However the authors fail to indicate if any socio-demographic and economic variables, historically believed to affect this relationship, were assessed or controlled for. Also, the study size was small (231) and the sample population fairly homogenous (Catholic University), undermining the study power and generalizability.

Positive Association

More researchers reported a positive relationship between religiosity and contraceptive use.

Davidson *et al.* examined the relationship between the influence of women's religiosity on their sexual attitudes and behaviors [48]. As part of their analysis, they assessed the interaction between religiosity, measured by frequency of attendance, and condom use, and they determined that women with higher religiosity were more likely to use a contraceptive at first coitus. This relationship was however not statistically significant ($\chi^2 = 5.146$; $p = 0.076$). Notably,

the study numbers were relatively small (535 women), and the sample was limited to only unmarried women. Miller and Gur shared similar association between frequent attendance and responsible birth control use, their relationship was statistically significant ($p < 0.005$) [33]. They do however add that personal conservatism (another religiosity measure defined as rigid adherence to religious creed), was more strongly linked to exposure to unprotected sex.

Jones *et al*. also recognize this relationship in their article based on data from the 1995 NSFG Cycle V [28]. They indicate that bivariate analysis between religious affiliation and attendance frequency with contraceptive use at first sex suggests a positive association, although these associations disappear once they controlled for young women's demographic characteristics.

Two studies on religiosity and risky sexual behavior in African-American adolescent females also show a positive association between these two variables. Mc Cree *et al.* (2003), and Landor *et al.* (2011), both demonstrate that religiosity may be a protective factor against unprotected sexual intercourse, and lack of contraceptive use [30, 32]. While McCree and colleagues indicate that young women who had higher religiosity scores were likely to have used a condom in the past 6 months (Odds Ratio, 1.6; $p = 0.06$), and possess more positive attitudes toward condom use, Landor and associates results suggest that inconsistent condom use was negatively associated with (parental and adolescent) religiosity (-0.055; $t = -3.727$).

No Association

Most of the identified studies seemingly reported no relationship between religiosity and contraceptive behavior.

Kramer *et al*. reported in their study done to explore the impacts of individual-level religiosity on unintended pregnancy, that among fecund sexually active females, religious affiliation had no relationship with contraceptive use [12]. Their study used a large database (NSFG Cycle VI), considered current and childhood religious affiliations as well as certain religiosity exposure variables (significance of religion in daily life, and frequency of religious service attendance), and current contraceptive behavior as their outcome. They however do not assess religiosity as a composite measure.

Lefkowitz *et al*. study on college students was similarly constructed and looked at individual religiosity measures (religious service attendance, religion in daily life, religious adherence and religions' negative sanctioning of behaviors) as exposure variables [49]. They end up with similar results of no association for each measure. Additional limitations to their study included the small sample size (205), and some of their variables (for example "religions' negative sanctioning of behaviors") may be difficult to understand and hence re-create in other studies.

Gold *et al*. (2010) nonetheless examine this relationship using a composite description of religiosity as their exposure variable [16]. Their study based on data from a hospital-based adolescent clinic examined the relationship between religiosity and recent or planned contraceptive use (as their contraceptive behavior variables) and conclude that there was no association (adjusted Odds Ratio (High vs. Low), 1. 46; 95% CI: 0.65 – 3.26). One important

limitation of this study was that about a third of their sample was not sexually active or experienced.

Assessing the relationship with religiosity as a single-measure exposure variable also yielded analogous results. Romo *et al*. evaluated the relationship among pregnant Hispanic women in their study, using church attendance frequency as their religiosity measure [59]. They discovered and published that though religiosity was associated with family size, it was not associated with contraceptive use consistency in these women. Although their population of pregnant women might have been a limitation, it also represents the proportion of sexually active women who eventually intend/intended to get pregnant.

Similarly experiences outside the U.S. tend to point in the same path of no association.

In a study to assess this relationship among young students of low socioeconomic group in Porto Alegre, Brazil, Elder Cerqueira-Santos *et al.* revealed that among 1013 impoverished students, condom use was equally high among both religious and non-religious youths with no statistically significant differences (Odds Ratio, 1.02; $p > 0.05$) [26].

Similarly, an article by Mishtal and Dannefer on Catholic Church and contraception in sexually active polish women indicates, using quantitative bivariate analysis, that despite the increased political power of the Catholic Church in Poland since the fall of state socialism in 1989, Catholic religiosity does not play a significant role in women's contraceptive behavior (including use) [60].

Religiosity and Contraceptive choice

According to the 2010 CDC report on the use of contraception in the United States, the most common currently used contraceptive choices by women were the pill (17.3%), female sterilization (16.2%), and the condom (10.0%) [13]. Different factors have been linked with contraceptive choice and several studies have associated religious groups and denominations with certain choices of contraceptive methods [17, 39, 41, 45]; not many try to make the link between religiosity measures and a sexually active woman's preference on method choice. Varying associations have however been reported.

As previously pointed out, Goldscheider and Mosher noted that Protestants and Catholics have generally differed in their main method of choice [36]. In this same context, Tanfer *et al.* comment on the significance of religiosity and religious conservatism; they report that Mainstream Protestants were three times as likely as Conservative Protestant women and twice as likely as Catholic women to use the pill or the IUD than to use no method [17].

The study by Kramer *et al.* (2007) also evaluated for any effect of religious affiliation and some religiosity measures on choice of using commercial contraceptive methods versus coital avoidance methods (defined to include withdrawal, natural family planning, and cervical mucus testing methods) [12]. They reported no association between the religiosity variables and method choice, though they include that household income somewhat modified the effect of religious affiliation on coital avoidance.

Similarly, Venkat *et al.* (2008) found no significant correlation between frequency of visits to one's place of worship and beliefs about the safety or efficacy of OCPs and IUDs [45]. They reviewed the effect of religiosity on the beliefs about safety or efficacy of contraceptive

methods among urban Latino women and maintain that women's beliefs about methods to use depend on factors such as method safety, side effects and effectiveness, rather than on religious affiliation or religiosity.

Finally, Davidson *et al.* also report that religiosity seems to have no effect on the choice of contraceptive method (Diaphragm, Condom and Oral Contraceptive) at first intercourse (χ^2 = 6.619, p = 0.157) [48].

METHODS

The data for this analysis is from the most recent Cycle (VII) of the NSFG survey (2006 -2008). This nationally representative complex probability sample of 7,356 women is based on the periodically conducted interviews by the National Center for Health Statistics (NCHS) among women ages 15 to 44 years old. The dataset presents an overview on issues affecting aspects of fertility and family life in the United States, and ultimately reflects the fertility, marriage, cohabitation, contraception, and other related experiences of 62 million American women of reproductive age [1]. The study was exempt from IRB review because no human subjects were directly involved.

Inclusions/Exclusions

The individual level analyses centers attention on women at risk for unintended pregnancy. This represents women who are not currently pregnant or postpartum, intending to become pregnant, not sterile (surgically or nonsurgical), and have had heterosexual intercourse within the 3 months preceding the interview. This sub-population allows us to focus evaluation on contraceptive behavior between fecund and sexually active women by age, race, parity, marital status, and other important characteristics, since the percentages of these groups of women that have recently (or ever) had intercourse, vary.

Definition of Exposure

The religiosity dimension was measured considering the aspects emphasized in the literature; NSFG has an extensive list of questions to determine religious participation, attitudes and

belief. We chose to measure four important variables to assess individual's religiosity, based on the availability in our data base and the frequency of use (denoting importance), and validity in literature [16, 21, 36]; particularly we adapted the framework used by Gold *et al.*, highlighting the conduct and belief facets of religiosity [16]. The variables included in this index were 1) the indication of a respondents' current religious affiliation, 2) the current importance of religion in daily life, 3) the frequency of religious services attendance and 4) an indication of whether the respondent considered themselves to be fundamentalist.

The response options for religious association were based on the NSFG and NCHS classification for religious affiliation by denomination detail: None, Catholic, Mainline Protestant, Black Protestant, Fundamentalist Protestant and other religion (non-Christian groups including Islam and Jewish). Non-Christian religions were excluded from analysis because of the difficulty in dividing the groups within our dataset.

The current importance of religion in daily life served as a measure of the strength of subjective religious beliefs in the absence of express implication in the NSFG questionnaire. Responses were: Not, Somewhat and Very Important.

Responses to frequency of attendance at religious services were recorded from the following options: More than once a week, once a week, 2-3 times a month, once a month (about 12 times a year), 3-11 times a year, once or twice a year, and Never.

To assess personal belief of fundamentalism, respondents were asked if they would consider themselves: A born-again Christian, charismatic, evangelical, fundamentalist or none.

An overall measure of religiosity was then created by summing up the values from responses to all four of the previous items: affiliation (none = 1, any = 2), frequency of attendance (never = 1

to daily = 7), importance of religion in daily life (not important = 1 to very important = 3) and fundamentalism (no group = 1, any group = 2), resulting in an index with a range of 4 to 14. They were then categorized into religiosity group tertiles (low, medium and high). This religiosity measure has a Cronbach alpha value of 0.68, indicating fair reliability.

Definition of Outcome

Contraceptive behavior was assessed among women at risk for unintended pregnancy, employing the variable current contraceptive use, coded as 'any' and 'none'. Current contraceptive use was defined in women currently (within 3 months of interview) having heterosexual vaginal intercourse, and the use of any method in women, regardless of efficacy, to prevent pregnancy and/or STIs secondarily. The exhaustive list of methods considered in the analyses is detailed in the NCHS codebooks (Table 2).

In a sub-analysis, the role of religiosity on individual's contraceptive choices was assessed using the choice of condoms versus pills as the outcome variable of analysis.

Additional Covariates

Study analyses also controls for some established covariates that influence contraceptive behavior. These include demographic factors such as age, race and ethnicity, parity, and marital status also, as well as socioeconomic factors as education status and household income.

Analysis

A descriptive analysis of the data was first performed by computing weighted frequencies and proportions with standard deviations for the exposure and outcome variables, along with the covariates. These figures were calculated in the total sample, then among a sample of women at risk for unintended pregnancy, and finally among contraceptors. Subsequently, chi-square tests were use to determine which covariates were significantly different among those women at risk for unintended pregnancy that were 'currently contracepting' versus those who were not.

Next, multivariate regression models were constructed using the categorical covariates: age groups (5-year groups); race/ethnicity (Hispanic, non-Hispanic white, non-Hispanic black, and others); marital status (Married, Cohabiting, Never Married and Formerly Married); education (< 12th Grade, 12th Grade and >12th Grade); household income in relation to poverty level (income below the poverty line, 100-199% of Poverty Line and 200% or more of Poverty Line); and parity (no births, 1 birth, 2 births and 3 or more births), as well as all two-way interactions between the exposure variable (religious index) and each of these covariates. Backward elimination was used with interaction terms successively removed with the aim of retaining those reaching significance levels of $p < 0.05$. Confounders were then assessed in the models by identifying which subsets of covariates were within 10% of the assumed "Gold Standard" Model (containing all possible confounders), and then subsequently using the most precise subset among eligible subsets of the covariates. Crude and adjusted ORs were considered in the analyses.

All analyses were completed with SAS 9.2 Software for Windows, licensed to Emory University - Rollins School of Public Health [61]. Specifically, SAS survey procedures were used for data analysis, to account for the complex sample design and weighting characteristic of the NSFG survey.

RESULTS

Descriptive Analysis

Overall, 7356 women ages 15 to 44 years were interviewed over the period of 2006 – 2008 in the first part of the Cycle 7 NSFG survey. A total of 1590 women were not currently sexually active (within 3 months of the survey), including 917 women who had never had heterosexual intercourse since their first period; 676 were pregnant, immediately postpartum or seeking pregnancy; with 166 surgically or non-surgically (non-contraceptive) sterile women. Consequently, 4924 women (58.3% of the original sample) were at risk for unintended pregnancy, representing an estimated 42.8 million American women at risk for unintended pregnancy (Table 1).

The distribution of the sample by the exposure and control variables is shown in Table 1. Approximately 38.2 million women are currently contracepting. The religiosity index tertile do not seem to vary across subset samples. Fewer younger women seemed to be at risk for unintended pregnancy, or were currently contracepting; with proportions less in the aforementioned subsets, compared to the proportions in the total population. The reverse was the case for the older women, the proportions of women at risk for unintended pregnancy and for contracepting was slightly higher than in the total population.

There was a statistically significant difference between the proportion of women contracepting by their marital/cohabiting status (P = 0 .04). A higher proportion of married women seemed to take fewer risks; their contracepting proportions (55.6%, SE 1.8) were higher when compared to the total population (43.7% SE 0.7). This was very different when compared to women who

were never married. They seemed to take more risks; their contracepting proportions (23.49% SE 1.26) were less than in the total population (36.9% SE 1.3).

Proportions were also significantly different by parity (p = 0.05) typified by distinction in contraceptive use among women with no births (43.5% (SE 1.3) in the total population and 31.2% (SE 0.8) among contraceptors).

Table 2 shows the distribution of a wide variety of contraceptive methods being used by women of reproductive age in the United States. The oral contraceptive pill (28.0% SE 0.9), male condom (16.1% SE 0.9) along with female sterilization are the most commonly used methods among these women. It is important to note that 8.0% of women reported using more than one method; these women were however classified according to the most effective of their methods by the NSFG.

Regression Analysis

No clear, patterned relationship was established in crude models between contraceptive use and religiosity among women at risk for unintended pregnancy. Table 3 shows that women in medium religiosity groups were less likely to use contraceptives when compared with women in low religiosity groups (odds ratio [OR], 0.90; 95% confidence interval [95% CI], 0.69– 1.17); while women in high religiosity groups were slightly more likely to use contraceptives compared with women in low religiosity groups (OR, 1.24; 95%CI, 0.97-1.60).

In the multivariate model, no interaction term remained following backward regression, and the variable for income in relation to poverty level was dropped following assessment for

confounding. The variables left in the model after assessment for interaction and confounding, are illustrated in Table 4. Controlling for the demographic and socioeconomic variables, there remains no statistically significant relationship between the high religiosity group and contraceptive use among women at risk for unintended pregnancy. Using low religiosity group as a reference for comparison, women in the high religiosity group were less likely to use contraceptives (OR, 0.74; 95%CI, 0.52 – 1.06).

In a sub-analysis to establish any association between religiosity and contraceptive choices among women at risk of unintended pregnancy, a model was created to compare the use of condoms versus pills in this subset of women, among religiosity groups. The effect of religiosity on condom use was modified by poverty level income ($P < 0.001$). The adjusted ORs for use of condoms versus pills among contraceptors by religiosity, showed differing association between the variables at different levels of poverty level income (Table 5). The adjusted OR for use of condoms among low earners (household income below 100% of poverty line) was only slightly less in the higher religiosity group compared to the low religiosity group (OR, 0.94; 95%CI, 0.39 – 2.27). Concurrently, using the low religiosity group as a reference among moderate earners (household income 100 -199% of poverty line), women in higher religiosity groups used significantly less condoms compared to pills (adjusted OR, 0.48; 95%CI, 0.33 – 0.68). Finally, among the highest earners (household income 200%+ of poverty line), the model shows that compared with women in the lower religiosity group, women in the high religiosity group are slightly more likely to use condoms than pills for contracepting (adjusted OR, 1.03; 95%CI, 0.53 – 1.98).

DISCUSSION

The effect of religion on individual health and human behavior has never been contested; the subject of what effect, and its importance if any are often the focus of debate. This debate is more pronounced in a society like the U.S. where only about 17% of women reported no religious affiliation; the consequence of which can be particularly seen in the significant pressures exerted by religious groups in discourse on various health-related matters in the U.S., and their power to influence political behavior and policy implementation, especially in issues of reproductive health [62].

With respect to reproductive health, explaining the effect of religion and religiosity on a woman's sexual and reproductive behaviors generates several hypotheses and theories. Several researchers believe that more religiously intense women often subscribe to behaviors that protective against sexual risk-taking, but at the same time risk factors for non-contracepting [36, 50]. This somewhat particularistic theory was the basis for generating the hypothesis in this study that women in high religiosity groups would be less open to using contraceptives than their less religious counterparts. However, the analysis in this study suggests that despite the fact that religiosity plays a role in contraceptive use, the effect is non-significant. The results fail to agree with several studies that assert that there is a negative association between religiosity and contraceptive use among women; maintaining that women in higher religiosity groups use less contraption [31, 41, 56]. The results are conversely consistent with the majority of prior research in this area that concludes that higher religiosity has no significant effect on contraceptive use among women [16, 26, 47, 49]. Particularly it agrees with results from the

study by Gold *et al.* which uses a similar composite religiosity measure (religiosity index) to assess the relationship between this variable and contraceptive use [16].

The influence of secularization in the U.S. society is typically an immeasurable effect that may directly be interfering or modifying the effect of religiosity on contraceptive use. Women are more likely to be more aware of contraceptive methods, even if they are not particularly informed in religious settings. Their need for achieving optimal fertility (as explained in "convergence" theories) underlines the desire to use contraception [36].

Another explanation suggested by some researchers, is that there are no significant difference across levels of religiosity due to the fact that religious organizations lay emphasis on the importance of abstinence, and not on non-contracepting [16].

Past studies also suggest that more religious women were likely to use less effective methods of contraception [36, 41]. Comparing two of the more commonly used and reported methods, condoms and oral contraceptive pills (OCPs), based on this theory, this study hypothesized that more religious women would be more likely use condoms rather than OCPs as their choice of contraception (OCPs are reportedly about twice as effective in contracepting [13]). Results from this study are not in concord with this hypothesis; women in high religiosity groups, stratified by poverty income level, were not significantly likely to use condoms more than OCPs as their method of contraception. This fails to concur with results from Tanfer *et al.*, which state that fundamentalist affiliations tend to use condoms for contraception, compared to mainline religious affiliations (Protestants) [17]. It agrees with evidence from several other existing literature however, that state that there is no association between religiosity and choice of

contraceptive [48, 58]. A likely explanation for the results of this study is that contraceptive choices are most likely due to a combination of factors and not solely religiosity, opinions echoed in other studies [34]. Important factors include race, education, household income and, marital status (as shown in this study, never married women have much higher risk-taking OR, compared with married and so probably use less effective methods).

The main indication is that religiosity, singly, is not sufficient enough to predict the use or choice of contraceptives among women at risk for unintended pregnancy, even in the U.S. which boasts of high levels of personal and community-level religiosity.

Study Strengths and Limitations

The main strength of this study is the large study size which confers study power, and is extensively representative for the heterogeneous population of American women of reproductive age.

The complex nature of religion, religiosity and spirituality often makes it difficult to analyze these concepts and their relationship with human behavior and attitude.

One study limitation was capturing the entire phenomenon tied to religion and religiosity. Using this index only considers facets deemed important b the NSFG. They can easily and defensibly be criticized.

Another limitation is imploring a relatively novel composite measure for religiosity. The study is limited to only a couple of sources of validation, and methods in these sources significantly differ. Also, the weighting system for the index variables denotes that certain variables were considered more important than the other (for example, frequency of attendance (maximum

score = 7) contributes more to the index measure than importance of religion in daily life (maximum score = 3)). However, it was established in a sensitivity analysis that equally weighting of individual variables produced different ORs but similar trends and significance in results, as the unweighted equivalents. The religiosity index employed in this study is far from perfect, but paves the way for exploration of composite measures for assessment of the impact of religion and religiosity.

Finally, as with survey analysis, it is important to note that our logistic regression models estimate weighted sample prevalence odds ratios. The prevalence ORs are only an estimate for population prevalence ratios and will exaggerate the actual ratios when the event of interest is not rare. Interpretations should therefore be made with caution.

Conclusion

The outstanding incidence of unintended pregnancy in the United States, a 'developed' country, underlines the need for a better understanding of the determinants of reproductive behavior and attitudes that may result in unintended pregnancies and its consequences. Despite the failure of the study to demonstrate a significant association between religiosity and contraceptive behavior, this relationship must be continually explored, perhaps in other heterogeneous populations. Other important findings must also be investigated. One such finding in this study of utmost concern is the low use of contraceptive methods among never-married women.

Ultimately, facilitating the knowledge and use of suitable family planning and contraceptive methods are critical to improving comprehensive women's health care with the added benefit of tackling the burden of mistimed and unwanted pregnancy.

Future Directions

This study demonstrates the importance of gaining insight into the determinants of effective contraceptive use. Substantive tools should be developed to assess these factors, and identify those that are protective and those that are precarious. This information will provide public health professionals and clinicians with knowledge about the true levels of risk of unintended pregnancy and its sequelae among U.S. women, and enable them to make informed decisions aimed at reducing these numbers in the country.

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Table 1: Sample size and Weighted Estimates of Religiosity Index and other Descriptive Characteristics of U.S. women aged 15–44 years, by number at risk of unintended pregnancy[a] and percentage of women currently using a method of contraception[b], NSFG (2006–2008).

		Total (N = 61.9 million)			At Risk for unwanted Pregnancy (N = 42.8 million)			Contraceptors (N = 38.2 million)			
		Sample frequencies (Total = 7356)	%	SE	Sample frequencies (Total = 4924)	%	SE	Sample frequencies (Total = 4323)	%	SE	X^2 P-Value[c]
Religiosity Index											
	Low	2516	31.86	1.27	1769	33.79	1.41	1551	33.71	1.60	0.91
	Medium	2553	35.06	1.47	1739	35.46	0.82	1524	34.95	0.75	
	High	2287	33.08	1.97	1416	30.75	1.38	1248	31.34	1.55	
Age (yrs)											
	15–19	1381	16.86	1.00	526	8.46	0.66	429	7.69	0.66	0.19
	20–24	1289	16.39	0.43	868	15.14	0.71	739	14.52	0.68	
	25–29	1379	16.57	0.89	1007	17.47	1.13	887	17.23	1.23	
	30–34	1201	15.50	0.33	892	16.94	0.97	802	17.63	1.12	
	35–39	1074	16.93	0.85	831	20.35	0.78	736	20.57	0.96	
	40–44	1032	17.75	0.69	800	21.64	0.69	730	22.37	0.78	
Marital status											
	Married	2479	43.65	0.73	2008	53.16	1.34	1828	55.58	1.80	0.04

	Cohabiting	812	11.03	0.66	634	12.46	0.66	565	12.71	0.88	
	Never Married	3299	36.93	1.27	1731	25.65	1.06	1447	23.49	1.26	
	Formerly Married	766	8.39	0.28	551	8.72	0.42	483	8.23	0.66	
Race/ethnicity											
	Hispanic	1613	16.77	2.16	1047	15.60	2.22	916	15.89	2.41	0.95
	NH White	3869	62.14	2.09	2672	64.02	2.20	2393	64.69	2.33	
	NH Black	1448	14.31	1.03	947	13.56	1.32	791	12.56	1.29	
	Other	426	6.78	0.81	258	6.82	0.86	223	6.86	0.83	
Educational Status											
	< 12th Grade	2066	24.57	1.08	1134	18.51	0.66	959	17.91	0.56	0.30
	12th Grade	1762	22.64	0.70	1242	24.83	1.26	1086	24.69	1.19	
	>12th Grade	3528	52.79	1.36	2548	56.66	1.05	2278	57.40	1.03	
Household Income Status											
	Below Poverty Line	1923	21.95	1.15	1208	18.89	1.07	1026	18.28	1.23	0.61
	100-199% 0f Poverty Line	1731	22.64	1.00	1142	22.21	0.82	1014	21.87	0.51	
	200%+ of Poverty Line	3702	55.42	2.06	2574	58.90	1.87	2283	59.85	1.71	
Religious Group											
Protestant	**Evangelical**	1331	21.66	2.11	880	21.39	1.88	792	22.01	1.76	0.98
	Mainline	1006	16.29	2.22	716	18.23	2.44	639	18.66	2.48	
	Black	1029	9.78	0.85	689	9.45	1.22	578	8.94	1.15	

	Catholic	1941	24.90	1.01	1312	24.99	1.37	1151	24.86	1.43	
	Other Religion	701	10.58	2.46	405	8.77	1.66	360	8.92	1.73	
	No affiliation	1348	16.80	1.11	922	17.17	1.17	803	16.62	1.24	
Parity											
	0 births	3348	43.45	1.27	1726	32.42	0.64	1465	31.19	0.83	0.05
	1 birth	1355	16.73	0.74	935	17.08	0.41	789	16.13	0.56	
	2 births	1412	20.76	0.45	1188	26.40	0.94	1077	27.45	0.99	
	3 + births	1241	19.06	0.44	1075	24.10	0.57	992	25.23	0.80	

[a]''At risk for unintended pregnancy'' refers to all fecund women, not seeking pregnancy, who have had intercourse in the three months prior to interview.
[b]''Currently contracepting'' refers to use of any method of pregnancy avoidance in women currently having heterosexual intercourse.
[c]Chi-square p-value refers to the hypothesis test that proportions of variables in contraceptors are similar in the total population.

Table 2: Percent distribution of current contraceptive methods* among women 15 - 44 years in the United States, 2006–2008		
Contraceptive methods	**Percent Distribution**	**SE**
Female sterilization	27.06	0.86
Male sterilization	9.90	0.96
Norplant or Implanon implant	0.09	0.07
Lunelle (injectable)	0.24	0.10
Depo-Provera (injectable)	3.19	0.40
Pill	27.99	0.91
Contraceptive Patch	0.78	0.14
Contraceptive Ring	2.40	0.30
Morning-after pill	0.15	0.05
IUD	5.50	1.48
Diaphragm (with or w/out jelly or cream)	0.08	0.02
(Male) Condom	16.12	0.86
Foam	0.02	0.01
Today(TM) Sponge	0.03	0.02
Suppository or insert	0.03	0.02
Jelly or cream (not with diaphragm)	0.05	0.02
Periodic abstinence: NFP, cervical mucus test or temperature rhythm	0.22	0.07
Periodic abstinence: calendar rhythm	0.85	0.32
Withdrawal	5.22	0.12
Other method	0.08	0.06
*** For women who used multiple methods, they were classified by the most effective method they reported using.**		

Table 3: Crude odds ratios (ORS) for contracepting[b] among U.S. women ages 15 to 44 years, at risk for unintended pregnancy[x], by religiosity.

		Crude OR	95% Confidence Interval	
Religiosity Index				
	Low[a]	1.00	-	
	Medium	0.90	0.69 - 1.17	
	High	1.17	0.89 - 1.52	

[a]Referent group.
[b]''Currently contracepting'' refers to use of any method of pregnancy avoidance in women currently having heterosexual intercourse.
[x]''At risk for unintended pregnancy'' refers to all fecund women, not seeking pregnancy, who have had intercourse in the three months prior to interview.

Table 4: Adjusted odds ratio (OR) for currently contracepting[b] versus non-contracepting among U.S. women age 15 to 44 years at risk for unintended pregnancy[a].

		Model**		
		OR	95% Confidence Interval	
Religiosity Index				
	Low[a]	1.00	-	-
	Medium	0.62	0.44	0.87
	High	0.74	0.52	1.06
Age (yrs)				
	15–19[a]	1.00	-	-
	20–24	0.94	0.62	1.42
	25–29	0.91	0.64	1.29
	30–34	1.36	0.95	1.94
	35–39	0.88	0.58	1.32
	40–44	1.08	0.76	1.53
Race/ethnicity				
	Hispanic	1.17	0.77	1.76
	NH White[a]	1.00	-	-
	NH Black	0.50	0.22	1.12
	Other	0.97	0.72	1.32
Educational Status				
	< 12th Grade	0.69	0.65	0.74
	12th Grade	0.84	0.70	1.01
	>12th Grade[a]	1.00	-	-
Parity				
	0 births[a]	1.00	-	-
	1 birth	0.73	0.42	1.26
	2 births	1.56	0.79	3.08
	3 + births	1.85	0.97	3.55
Marital status				
	Married[a]	1.00	-	-
	Cohabiting	0.97	0.57	1.64
	Never Married	0.46	0.18	1.14
	Formerly Married	0.42	0.20	0.88

[**] Odds for contracepting versus non-contracepting by religiosity, adjusted for age, race, marital status, parity, income and education.

[a]Referent group.

[b]"Currently contracepting" refers to use of any method of pregnancy avoidance in women currently having heterosexual intercourse.

[x]"At risk for unintended pregnancy" refers to all fecund women, not seeking pregnancy, who have had intercourse in the three months prior to interview.

TABLE 5: Adjusted odds for use of condoms versus pills by Religiosity among Contraceptors

		Model*		
		OR	95% Confidence Interval	
Household income < 100% poverty line				
	Low Religiosity[a]	1.00	-	-
	Medium Religiosity	0.69	0.55	0.85
	High Religiosity	0.94	0.39	2.27
Household income 100-199% of poverty line				
	Low Religiosity[a]	1.00	-	-
	Medium Religiosity	0.63	0.25	1.62
	High Religiosity	0.48	0.33	0.68
Household income 200%+ poverty line				
	Low Religiosity[a]	1.00	-	-
	Medium Religiosity	1.13	0.52	2.44
	High Religiosity	1.03	0.53	1.98

[*]Odds for using condoms versus pills by religiosity, adjusted for age, race, marital status, parity, income, education and an interaction between religiosity and income.

[a]Referent group.

[b]Contraceptors here refers to all women who reported a technique or method for pregnancy avoidance during intercourse.