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Bethany Ullrich Welstead Date

REPEAT TEENAGE PREGNANCY IN GEORGIA:

ARE WE MISSING INTERVENTION OPPORTUNITIES?

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Bachelor of Science

Furman University

2011

Thesis Committee Chair: Carol Hogue, Ph.D.

An abstract of

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Abstract

REPEAT TEENAGE PREGNANCY IN GEORGIA:

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By Bethany Ullrich Welstead

Purpose: To determine the effect of family planning visits after an adolescent mother's delivery of her first child on her likelihood of having a rapid repeat birth (RRB), defined as a second birth within 24 months of the first.

Method: Using data from the Georgia Department of Public Heath, we used logistic regression to estimate the odds of having at least one family planning visit for adolescent mothers dependent upon whether or not the adolescent mother had a RRB.

*Results***:** After controlling for other factors including age, race, and Medicaid receipt, the occurrence of a family planning visit for teen mothers was determined to be protective against having a RRB (OR = .710)(p=.0003).

Conclusion: As family planning visits for adolescent mothers can be protective against having a RRB, it is important that public health departments focus on increasing the proportion of adolescent mothers visiting family planning clinics after their first birth. Furthermore, it is important that public health policies begin to focus on changing the upstream factors that result in adolescent pregnancy, and not penalize the pregnancy itself.

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List of Abbreviations:

RRP	**Rapid Repeat Pregnancy**
RRB	**Rapid Repeat Birth**
STIs	**Sexually Transmitted Infections**

CHAPTER I

Background

While both teenage pregnancy and birth rates have declined by more than 30% over the past fifteen years, the United States continues to have the highest teenage pregnancy rate of any developed country (1)(2). The global average was 65 births per 1000 15-19 year old teens in 2005, and the United States was surprisingly close at 41 births per 1000 (3). Great Britain and Canada fell at only about half this number (4). Richio et al. estimated that one-tenth of adolescents in the U.S. become pregnant each year, leading to upwards of 400,000 annual births (5). Omar et al. suggested that by the age of 18, 25% of American teens have become pregnant, and by 20, the percentage jumped to 34% (1). Recent trends do indicate that teenage pregnancy rates have been abating over the past decade, though. In younger teens, aged 15-17 years, the birthrate reached a high of 38.6 per 1000 in 1991, and then, decreased by 42% to total only 21.4 per 1000 in 2005 (1). Pregnancy rates in this specific age group declined a similar 33% (implying a discrepancy between pregnancy and delivery).

This declining rate does not counteract the fact that, as a result of population momentum, for now the absolute number of adolescent females of child-bearing capabilities increases between 5 and 10% annually (6). Thus, the number of teenage pregnancies stands to continue to substantially increase into the 21st century. Furthermore, because the birthrate decline resulted primarily from a marked decrease in first-time teenage births with little fluctuation in repeat births, repeat teen pregnancy has only increased in relevance (7). It has been estimated that 22% of all births to teenage mothers are repeats—meaning that nearly 1 in 4 parous women in this age group give birth at least one more time while in this age range (8). In 2010, National Vital Statistics reported 365,000 births among teenagers age 15-19

years, and 66,800 of these were repeat births (and 14% of these repeats were third or higher order births) (9). Another systematic review indicated that repeat teenage pregnancy rates could be as high as 41% (10). A study analyzing time to pregnancy in these parous adolescent mothers found that the second delivery can occur as early as 10.5 months after the first, meaning that these women are at risk for a second pregnancy almost as soon as they leave the delivery room. A study by Jacoby followed one hundred women between the ages of 13 and 21 receiving prenatal care. Within one year of delivery, 43.6% of these women were pregnant again (11). This high percentage fit squarely into Jacoby's own background research, which includes findings ranging from 19% to 66%. Furthermore, other published studies fit squarely into Jacoby's background findings, ranging between 19 and 63% (12) (13) (11) (14) (15) (16) (17) (18) (19).

Pertinent for this study, incidence of repeat pregnancy fluctuates dependent upon region and state of the country. Eight states reported percentages of teenage pregnancy greater than 20% in 2010, and Georgia ranked third among them at 21% (9). Regardless of where along the range the true number actually falls, it is reasonable to estimate that nearly one-quarter of teenage mothers will give birth to another child within two years of delivering the first child. This high percentage indicates that the burden could be higher than most public health experts believe and demonstrates, at the very least, the urgency of the problem.

Consequences of Teen Pregnancy

The extensive literature exploring teenage pregnancy provides ample evidence of the adverse effect of a teenage birth on both mother and child. Immediate risks from teenage pregnancy include increased probability of low-birth weight deliveries and infant mortality,

from either acute infections or sudden infant deaths syndrome. Increased maternal mortality is also higher. Pregnant adolescents are less likely to seek adequate prenatal care during their pregnancy (specifically within the first trimester) and less likely to embrace healthy prenatal practices, leading to increased incidence of gestational hypertension, anemia, and low weight gain while pregnant (20). Moreover, young age and lack of experience reduce the probability of economic self-sufficiency. Estimates denote that somewhere between 50-80% of teen mothers claim welfare within five years of delivery (1). Teenage pregnancy-associated costs total more than $7 billion annually, and Richio et al. found that in 2004, the number reached $9.1 billion (1) (5) (2). Teenage pregnancy is heavily associated with poverty, and, therefore, to the adverse outcomes that often come with it—including school dropout and worsened physical/mental health outcomes. Utilizing birth rates from 2000 (83 per 1000 teenagers), Omar projected that, had the rate not steadily declined in the next decade, 1.2 million additional births would have occurred. Of these 1.2 million children, nearly 460,000 would be living in poverty and 700,000 in single-parent households today (1). A host of long-term repercussions are enumerated as well, including lower educational and occupational achievement for the mother, higher rates of poverty, and subsequent welfare dependency. Children born to an adolescent mother have been identified as performing poorly on intelligence and vocabulary tests compared to children with older mothers. Furthermore, research has found an increased risk of academic frustration, exemplified in behavioral problems and grade failure (21) (22) (23). Teenage mothers are often pegged as ineffective parents because they lack the emotional maturity and fundamental knowledge necessary for the role. As such, research suggests they are less inherently responsive to their infant's needs and, to compensate, often adopt relatively

punitive styles of parenting (22). Studies have identified higher incidence of child abuse in families headed by a single adolescent mother as well; Stevens-Simon reported that 19% of the children in her 1999 study were removed and relocated into protective custody away from the mother (24). Furstenberg recently concluded a longitudinal study following teen mothers and their children for thirty years (23). At the seventeen year follow-up, when the children were in their late teenage years, those who were in the most unstable situations (specifically single parent, low income households) were experiencing a wide range of problems, including incarceration, school dropout, and teen pregnancy (23). By the end of the study, only half of the offspring were "doing well" by the standards of the researchers—interpreted as being self-sufficient with a high school education and employment (23).

The risks associated with teenage pregnancy are compounded with an additional birth. A systematic review conducted by Akinbami et al. found that with each additional birth, the likelihood of insufficient prenatal care, preterm delivery, low birth weight, and school discontinuation increase (24). These results are corroborated throughout the literature. Adolescent mothers who have a second pregnancy are at greater risk to experience the negative economic consequences that early childbearing brings with it—specifically education inadequacy, unemployment, and welfare dependency (24) (12) (26) (73). Further complicating the outcomes of teenage pregnancy, adolescent mothers are more likely than older mothers to have closely spaced births (14). These rapid repeat pregnancies, defined as the occurrence of a second pregnancy within 24 months of the delivery of a previous child, have been shown to exacerbate negative outcomes, including premature delivery, low birth weight, and developmental delays (14). Klerman found that adolescents with more than one child are less likely to finish their education or become economically

stable (28). Pfitzner et al. in their study of the Teen Mother and Child Program in Utah found that those who had a repeat pregnancy averaged half a grade level less than those who did not. They were also more likely to suffer psychiatric complications, either contemplating or attempting suicide (6). Additionally, second births to teenage mothers have been linked with significant negative impacts on both behavioral and health outcomes for the children (29) (30). A number of other consequences found to a greater extent in children of repeat teenage pregnancy include less health care, lower IQ scores, public assistance dependent, higher probability of living in foster care, higher rates of juvenile delinquency, and higher rates of becoming teen parents themselves (14). Milne et al. referred to this phenomenon as the "cycle of deprivation" created by adolescent pregnancy, and Omar illustrated it as having "devastating outcomes for individuals and society," spanning across multiple generations (3) (1).

However, some studies have demonstrated that young maternal age is not necessarily indicative of poor outcomes (such as low socioeconomic status and lack of education) for either the child or mother later in life. It is important to note that a teen pregnancy is not equivalent to a death sentence for the possibility of success for these women. Many teenage mothers do ultimately improve determinants of their socioeconomic status including education and employment, even though often at much slower rates than non-parous peers (23). At the conclusion of a thirty year longitudinal study following parenting adolescents through their life course, Furstenberg concluded that teenage pregnancy had been "misunderstood from the start." By the midpoint of this follow-up, the mothers had made substantial gains in their education and employment repertoires. Nearly 80% had graduated high school and more than 10% had gone on to earn a college degree. The majority of

mothers was working full-time jobs and could be classified as either working or middle-class status (23). Notably, other studies confirm this finding, determining that in middle age, women who were teen mothers often pay the same or more in taxes, implying similar or even higher incomes, than those from similar backgrounds who were not teen mothers (31). In fact, most adolescent mothers cease welfare acceptance by the age of 22, and over the next decade, their employment will actually offset all previous costs to the system (32). SmithBattle alleged that the $9.1 billion annual cost from teenage pregnancy is likely to be grossly overestimated, and the negative consequences that are so heavily documented in the literature disappear after research accounts for the social determinants that are often associated with early pregnancy (33). Comparing adolescent mothers to their peers who would have been mothers but instead miscarried cleverly provides an estimate of the counterfactual. Surprisingly, the results posit that the teen mothers earned more over their lifetime than their peers, and the amount they paid in taxes would actually have decreased had they delayed childbearing (34). These authors reported that the net amount of transfer payments made to these women would actually increase by $1200 per teenage mother when taking into account the lower tax revenues (31). The possibility that delaying childbearing by teen mothers might actually increase spending on public assistance is rarely referenced in the ongoing discourse relating to teenage pregnancy. Instead, the presumption that preventing teen childbearing would result in cost savings is taken as indubitable. While it might be difficult to accept a cost-savings aspect of teen pregnancy, the findings might make it more palatable to question traditional suppositions.

Geronimus has also provided evidence to refute the assumed relationship between maternal age and poor reproductive outcomes (35). In 2001 among non-Hispanic black

mothers in Harlem, rates of low birth weight were actually lowest among infants born to mothers in their mid to late teenager years. Infant mortality rates were found to be nearly twice as high in older mothers as in teenage mothers. A similar study conducted in black communities in Michigan found that the infant mortality rates experienced by 15 year old mothers were half that of 25 year old mothers and one-third that of 35 year old mothers (35). Hotz et al. analyzed early studies of the correlation between maternal age and deleterious outcomes and determined that unobserved background variables substantially confound the relationship between age and infant health and, therefore, the interpretations. Empirical studies that account for background factors reach conflicting conclusions about the impact of teen pregnancy on the child's development and educational ability. Hotz et al. confirmed that the reviewed multivariate studies provided no support for the predicted negative outcomes. In fact, they collectively point to a lack of any conclusion, unable to determine if the relationship is slightly negative, slightly positive, or altogether negligible (31). A study conducted by Moore et al. in 1997 found that, among their national sample of 4-14 year old children, those whose mothers gave birth at 18 or 19 actually outperformed those whose mothers were in their twenties on reading and math tests (36). A study conducted by Geronimus three years earlier among children of sisters, one of whom had an adolescent pregnancy, discerned similar results. The difference between the children's performances on standardized tests was mainly insignificant; findings that met the significance threshold actually pointed to favorable outcomes for the children from adolescent mothers (35). The commonality among these studies is the methodology by which they control for confounding background factors. The majority of teenage mothers come from ethnic minorities and disadvantaged socioeconomic status, and these factors are substantially

correlated with both early motherhood and adverse maternal outcomes—the classic definition of confounding. Many early and widely cited studies reported a large negative association between young maternal age and child health and economic outcomes, but by design assumed direct causal effect. SmithBattle summarized the general consensus, "teens could presumably avoid these poor outcomes by postponing pregnancy." She critiques the research that spurred these conclusions, saying that studies have almost all been cross-sectional in nature and fail to account for the pertinent social discrepancies when comparing teen mothers and older mothers. Leaving out these confounders magnifies the negative effect that adolescent pregnancy has on maternal and economic outcomes. Studies during the past two decades that have allowed for the impact of background conditions on maternal and child outcomes have found the negative effects from young maternal age, mostly if not completely, disappear (33).

It is important to note, though, while an adolescent mother with one child may be only slightly disadvantaged in the long-run compared to her non-parenting peers, a repeat pregnancy within the teenage years substantially frustrates efforts to catch up. However, the immediate adverse effects might not be as immediately dire as once believed either. Ample studies have found that multiparous teens have significantly higher rates of low birth-deliveries, neonatal, postnatal, and infant mortality rates (34) (37) (38). Again, Klerman et al. noted that these studies are primarily cross-sectional and do not account for the childhood disadvantage that predisposes girls to adolescent pregnancy to begin with and largely contributes to the continued disadvantage they will suffer later in life (29) (39). The limitation of these cross-sectional studies is that they often compare second births to adolescents to second births to older mothers. Longitudinal studies analyzing the same

question can compare first births and second births to the same teenage mother and often find directly contrasting results. Blankson et al. conducted a study at the Jefferson County (Alabama) Department of Health and found that when comparing births to the same mother, birthweight was significantly higher for the second baby at the same gestational age (40). Longitudinal studies such as this one often account for sociodemographic variables automatically in that most of the sample comes from the same population. Sweeney looked at births to women under 19 at the Women's Hospital and Perinatal Center in Memphis, Tennessee and determined that the average of the birth weights for all the first-born were much lower than the average for the second-born (41). Clear et al. confirmed that, in this population, the perinatal mortality and infant mortality rates are also lower among the second-born babies (42). However, the conclusion that teenage pregnancy is robustly associated with poverty remains throughout these studies. Klerman points to a selection bias as the cause of the confounding discrepancy as teens who have a first birth are likely to be from low, middle, or high socioeconomic status (28). Teens who experience a repeat birth after the first are much more likely to be of high socioeconomic risk, and thus are more likely to have poor pregnancy outcomes. Even if the second pregnancy is not as detrimental to the child's immediate health as first reported, the second child is still born into a disadvantaged situation into which one more obstacle has just been added. These adolescents, as acknowledged almost universally, are less likely to complete their education or find sufficient employment that will allow them and their two children to be economically self-sufficient (43). Especially as the amount of limited time and resources that can be invested in each child decreases with each successive pregnancy, the risk to the children becomes higher. Experts cite increased long-term sequelae, including

developmental delays, accidental and non-accidental trauma, delinquency, school dropout, and teen pregnancy again (44). Experts in the field have noted that "because adolescent mothers often end up in poverty but are from low-income families to begin with, questions of cause and consequences emerge (45)." Ultimately, while teenage pregnancy itself does not have a given unhappy ending, the factors that help it to develop are only exacerbated in its wake, confirming the "cycle of deprivation (1) (3)."

Motivations

Much research attempts to uncover the motivations teens have for having both one pregnancy and also a subsequent one. Unintended teenage pregnancy is often viewed as a problem of immaturity. The teenage brain, specifically the prefrontal cortex, has not yet developed enough to appreciate delayed gratification, prioritizing, consequence weighing, and control of impulsivity (46). It is estimated that 82% of all births to teens under the age of 18 are unintended; this proportion includes repeat pregnancies (47). However, as Herman pointed out, "one might expect that a young mother who already experienced a pregnancy would be more knowledgeable about sexual activity, contraception, and pregnancy. Why, then, did they not use prevention strategies (46)?" This query summarizes the proverbial elephant in the room. Gray et al. defined the prevention of repeat pregnancy as "an important, easy to define, but enigmatically elusive public health goal in the United States (43)." Much debate has centered on this question, and Lowenstein and Furstenberg posited in 1991 that not using birth control is the default behavior for many of these teens. In other words, it is the action they will take when they have no intentions for or against pregnancy. Impulsivity plays a role as well, as the consequences of using birth control during sex—

partner pressure, awkwardness, decreased pleasure—are immediate and predictable, whereas the consequences of unprotected sex are much less certain and much more distant.

A study of 245 adolescent mothers, of whom 42% had a repeat pregnancy, confirmed that 18% of these women had the second pregnancy intentionally. Analysis of data from the 2002 National Survey of Family Growth found that up to 34% of teenage pregnancies were intentioned (7). Milne raised the idea of intention to a goal of sorts, explaining that for some young women, early pregnancy is an aspiration. In explanation, Herrman offers that adolescent pregnancy can be viewed as an adaptive strategy for some socially disadvantaged young women (46). Pregnancy and motherhood can fill a need for familial closeness and self-esteem. This is not only a recent phenomenon, though. Geronimus contended in 1992 that young women in low socioeconomic backgrounds might purposefully have children while in their teenage years, taking advantage of what is most likely the healthiest period of their lives (48). It is important to note that pregnancy intentions are not always clearly expressed or defined by the teenager herself. In fact, mismatches in responses about pregnancy intentions have proven to be a substantial indicator of future pregnancy (2). One study defined only those who adamantly did not want a second pregnancy as unintended, while those who were not actively trying to prevent a pregnancy were considered intended (20). Gerrard et al. expounded upon the subject, differentiating the gray area between intention and willingness. They define intention as a "thoughtful consideration of outcomes, commitment to action, or plan to act." In contrast, willingness is a much more ambivalent response, often requiring not intention, but a lack of non-intention (47). Steinberg et al. corroborated this view, explaining that it is not bad judgment, per se, that teens exhibit, but instead it is a lack of any judgment. As statistics

show, the majority of repeat pregnancies are not intended (24). Most young women after delivery claim that they do not want to have another child "anytime soon (43)." They also typically are provided with access to birth control and counseling on its proper use—not to mention they have a heightened awareness to the possibility of pregnancy from improper use of birth control (50). Unfortunately, Gray explained, this increased vigilance often wanes in the demands of life as an adolescent with an infant. In a study of birth control compliance in the Young Parents Program, the first-year rates for usage fell from 63.2% to 33.8%, 15%, and 7% at 24, 36, and 48 months respectively (1). These mothers are at a higher risk for conception than their non-parous peers because "even those who do not want more children experience fluctuations in the motivation to remain non-pregnant, stop using contraception briefly, and…become pregnant by default (x)." While it is not an intentional decision in most, it is also not an unintentional decision.

Researchers have embraced several behavioral theories to explore teenage motivations (and lack thereof) for sexual activity and pregnancy. While rational decision-making models have been widely utilized to explain sexual and reproductive behavior in adults, Adler et al. pointed out that few apply these same models to adolescent sexual activity, assuming they would not account for the impulsivity and lack of rationality that may accompany it (51). Instead, Adler hypothesized that adolescents also make decisions based on conclusions about the consequences of their behavior and, therefore, a decision model can be used to explain resulting variance in teen contraceptive use and subsequent pregnancy. The theory of reasoned action suggests that intentions guide a person's behavior, and intention is determined both by a person's attitude toward the action and how the person perceives important figures in her/her life will view the action. Ultimately, an individual's

beliefs about the consequences of an action such as sex are multiplied by the values these consequences hold for the individual. This could be interpreted both positively and negatively, the value of social stigma against premarital sexual activity and the value of peer pressure promising acceptance. The consequence which the teen values more will have a higher multiplicative influence on behavior. Similarly, the perceptions the teen believes that others have toward a behavior and the relative weight the teen applies to each opinion make up the other impetus for intentions (51). Since rationality is not often explored as an integral aspect of teenage decision making, particularly in regards to sexual behavior, interventions fail to address the underestimated complexity of teenage decisions and, therefore, are widely ineffective (46).

In 2004, Villarruel et al designed a study to examine the Theory of Planned Behavior framework and its application to teenage pregnancy. This theory utilizes personal attributes (behavioral beliefs), subjective norms (normative beliefs), and self-efficacy (control beliefs) to determine a person's behavior (73). Results revealed a significant relationship between the attitudes, partner approval, and self-pride and a teen's decision to engage in sexual behavior over the course of three months, lending credence to Adler's conclusion that a rational model might work to predict variations in teen pregnancy (51). The researchers also found the individual's subjective norms, self-efficacy, and beliefs about his/her self-control were associated significantly with having protected versus unprotected sex within three months. Social-cognitive-ecological theories successfully utilized different levels of support in a teen's life, including individual, partner, family, and peer, to predict likelihood of repeat pregnancy.

Herrman embraced a framework development approach that is more adaptable to the development level of the unique teenager (46). Citing Drake, she described the three stages of adolescent psychological development. The early adolescence stage, from 11 to 15 years, is a chaotic time as the body undergoes physical and hormonal changes, and the teenager feels a loss of control. Middle adolescence, 14 to 18, is when the process of self-identification and realization begins. Late adolescence, 17 to 20, is characterized by determining how to live out the self that was identified in the previous phase (53). Intuitively, each of these stages will respond differently when confronted with sexual decisions (8). This view does not assume that teen sexual decision making and subsequent pregnancy is either completely rational or completely impulsive. Instead, it allows for a gray area. Erikson espoused this framework as well, explaining that teenage years are characterized by transition as the individual searches for his/her own identity and defines his/her own ideals and philosophies (54). This developmental theory is commonly utilized in research on repeat teen pregnancy, especially focusing on how the teen mothers handle the many changes, psychological, physiological, and cognitive, that come with motherhood (4).

Resiliency theory is a third framework commonly applied in regards to teenage pregnancy. This framework examines an individual's ability to overcome obstacles, to essentially "bounce back" from adversity. It is the process of utilizing strengths and resources to create a positive outcome and sense of confidence from a stressor (4). However, resiliency is not considered an inherent human trait; individuals must learn to focus their behaviors, thoughts, and actions in order to overcome setbacks. Interestingly, resilience can manifest into two forms—connective and self-protective. Often the presence of a supportive

and loving mentor is crucial to creating connective resiliency that will be helpful, as opposed to a self-protective, survival mode (55).

A recent theory proposed by Porter and Holness expounds upon a foundation of these three frameworks. The RRRTTPP, Resilience-Recoil-Rebound Theory of Teen Pregnancy Prevention, targets an adolescent mother at risk for a repeat pregnancy. The teen has inherent personal attributes (age, gender, race) and psychosocial factors (body image, self-efficacy, sexual behavior, school performance) that together characterize who the mother is. Resilience in this model is defined as "positive adjustment in the face of adversity, reflecting the elasticity of individuals and their capacity to overcome a crisis (4)." The Recoil-Rebound piece allows for initial backward momentum when a crisis or obstacle, such as an initial pregnancy, arises, as one prepares to "spring" forward to an ultimately more positive outcome. The model also accounts for the influence that the community -- family, peers, school, and church -- can have on a teen's ability to either be resilient or caught in the recoil phase. The family is credited with a strong influence on many teens' lives; however, this theory accounts for the fact that at-risk teens who are at risk of a rapid repeat pregnancy may not have a source of positive family support. Many developmental theorists posit that peer influence has a much stronger effect on the adolescent's behavior. Porter and Holness acknowledged the potential consequences of this, "if the peer group operates only within the present, without the benefit of historical context or foresight and planning, it could be of minimal support or even counterproductive for the at-risk teen faced with repeat pregnancy (4)." The model makes room for substantial influence on the teen's life from religious sources or school. Both are named as settings in which these at-risk teenagers can find positive role models who can effectively mentor and support them.

However, school can also be a negative influence as many schools may be lacking sufficient facilities to provide special programs that would facilitate support for the at-risk teens. Also, the probability of gang-activity and anti-social bullying within increases within economically-lacking areas. When the teen is surrounded by negative community factors and lacks a supportive foundation, she is more likely to spend an extended amount of time within the recoil phase. In fact, Porter and Holness posited that this recoil-rebound phase is reflective of the teen's ability to demonstrate resilience when faced with these difficult situations. Past negative experiences, including self-regarded relationship failure, poverty, and poor educational outcomes, can reinforce the lack of resiliency. The lack of resiliency is cyclically compounded by ambivalence, depression, anxiety, and guilt the teen might feel. With this swirl of negative emotions and experiences, the teen is likely to remain stuck in the recoil phase and to continue the risky, familiar behaviors that got her into it initially, including risky sexual practices leading to unintended repeat pregnancies.

Risk Factors

While any sexually active teenager is potentially at risk for a pregnancy and a potential repeat pregnancy, there are demographic risk factors that research highlights as particularly associated with both. Multiple studies have documented that low educational attainment and aspiration influences early sexual activity. Growing up in a single parent household or a family with little connectedness or parental monitoring also can heavily influence a teenager's probability of pregnancy (3). However, not all sexually active teens become pregnant once and, especially, not twice. A study comparing sexually active young women who do become pregnant with those who do not found that age at first intercourse, partner's age at first intercourse, and contraception use each had a significant impact on

probability of sexual activity leading to pregnancy (57). A host of different individual, dyad, and community factors can affect an adolescent mother's risk for subsequent pregnancy. Hispanic teens and non-Hispanic black teens are roughly 1.5 times more likely to have a repeat teen birth than are non-Hispanic white teens (9). The earlier the first delivery, the more likely it is that the mother will have another one before she is 20. This is intuitive as those who are older at first pregnancy are more likely to have aged out of the teenage category by the time they have a second. Also, a planned first pregnancy and/or plans to have another child within five years predict rapid repeat pregnancy (17).Adolescents with low self-esteem and low perceived control over their lives are also at a higher risk (51). Within the relationship, having a boyfriend who is more than three years the mother's senior, presence of a new boyfriend, or experiencing intimate partner violence all increase a woman's likelihood of rapid repeat pregnancy (17). In a study of one hundred women who received prenatal care at a non-profit health center, Jacoby reported that the occurrence of any physical or sexual abuse during the year-long study period increased the odds of repeat pregnancy by 3.46 times. A study analyzing the differences between contraception choices found that of those who took DMPA (depot medroxyprogesterone acetate, a long-acting form of birth control administered as a shot every 3 months), only 14.2% experienced a repeat pregnancy within 12 months, compared to 29.7% of those on OCP (oral contraceptive pill taken daily), and 31.8% on the patch (19). Raneri and Wiemann's multivariate logistic regression model analyzing predictors of repeat pregnancy reveals many of the risk factors in the seven variables it found to be significant: planning to have a second baby within five years, not having started long-acting contraception within 3 months of delivery, no longer in a relationship with father of the first child, father of first child being more than 3 years

older, having experienced intimate partner violence, not having returned to school by three months postpartum, and half or more of close friends also being parents (17). As Adler notes, unfortunately, many of these risk factors are not amenable to easy modification through intervention and, as such, contribute to the elusiveness of the success (51).

Interventions

The public health response to the teen pregnancy "epidemic" has come in many different forms, and educational interventions have been a widespread choice. There has been substantial emphasis on keeping pregnant teenagers in school as long as possible during pregnancy and encouraging a quick return to school after delivery (3). Raneri and Wiemann listed not being back in school within three months of delivery as one of seven significant indicators of increased risk for repeat pregnancy (17).This intervention sought to increase the opportunity costs that the teen associates with a second pregnancy by encouraging educational and career goals that do not allow for a second baby immediately (43). However, other researchers do not hold the education-based interventions in such high esteem. Stevens-Simon found that in bivariate analyses return to education significantly predicted likelihood of repeat pregnancy, but when controlled for in multivariate analyses that included type of contraceptive use and presence of nine or more predetermined risk factors, school enrollment was not significant (57). She claimed that "it remains to be demonstrated that interventions to promote return to school postpartum and consistent contraceptive use produce the enduring effects on fertility as has been associated with the natural pursuit of such activities." It should also be considered that the type of girl who chooses to stay in school during and after pregnancy is probably inherently different than the girl who does not, meaning substantial possibility for confounding by personality type.

While aspirations for education are important for helping teen mothers improve their life circumstances, they are likely not sufficient for keeping them. As Gray concluded, "there is nothing about these activities that necessarily make teens want to avoid conception…[they] have the same educational, career, and lifestyle goals as their less socio-demographically deprived counterparts…they do not believe adolescent childbearing is an impediment to achieving these goals (43)." The crucial part for interventions designed around education is to change these normative beliefs.

There are also many interventions that focus primarily on contraceptive use. There are several different methods of birth control available. Implants and intrauterine devices (IUDs) are considered the most effective with less than 1 pregnancy per 100 women annually. They both have to be procedurally placed by a doctor, and they last 3-5 years. Injectable birth control also must be provided by a health care professional, and one shot provides protection for 3 months. However, the injectable birth control, as well as the patch, the ring, the pill, and the diaphragm, result in 6-12 pregnancies per 100 women each year. The least effective methods of birth control include condom usage, the sponge, spermicide, or practicing withdrawal, responsible for nearly 20 pregnancies per 100 women annually (58). Only recently has long-acting reversible contraceptive options like the implants and IUDs become a topic of extensive research. A review of current birth control methods in adolescents determined that the rate of teen pregnancy while using an IUD fell between 2-10%, compared with .8% in the general population (59). However, when adolescents used it properly, the IUD was more effective than hormonal injections, with a risk ratio of .45 (70). She attributed the discrepancy in rates to lower rates of continuation within the younger population. Traditionally, many barriers to IUD use have existed in this population due to

lack of education about them—especially fear of lifelong infertility and severe side effects (59). Dodson et al. posited that in the coming years, IUDs will gain favor among health care professionals and, as more research is conducted to demonstrate their efficacy, physicians will be more willing to prescribe them for adolescent mothers. Instead, most interventions favor injectable contraception as the gold standard. A study conducted at the Medical University of South Carolina concluded that contraceptive type was a significant indicator of repeat teenage pregnancy. The mothers were allowed to select postpartum birth control before being released from the hospital after delivery of the first child, from DMPA, OCP or the patch (applied to the skin once every week). Those who chose OCP had an odds ratio of repeat pregnancy within 12 months that was 2.48 times that of those who chose DMPA. Those who used the patch had an odds ratio of 3.24 (s). An additional study of predictors of pregnancy found that not using a long-acting contraceptive (Depo Provera, Norplant, or an intrauterine device) had an associated odds ratio for repeat pregnancy within 24 months of 2.4 (17). A similar study conducted by Stevens-Simon found rates of repeat pregnancy at 12 months of 0%, 11%, 25%, and 28% for those using Norplant, Depo-Provera, OCP, and no method, respectively (60). These results provide concrete evidence that the choice of birth control has a significant effect on teenage pregnancy.

Many experts provide explanations for why long-acting contraceptives appear to be the most effective method of birth control over time. Kelly et al. points out that, with the many busy aspects of adolescent parenthood, diligent contraceptive use falls to the wayside. Stevens-Simon cautions those pushing only contraceptive use interventions to acknowledge that it is unlikely that contraceptives will have the same effect in adolescents only taking them as a result of an intervention as they would have in adolescents who would have

requested them of their own volition (18). The most important benefit interventions can gain from interventions utilizing contraceptives is "a unique window of opportunity" during which the adolescents can develop visions and goals for their lives that do not allow for a second birth (43). Since all contraceptives require long-term compliance and correct usage in order to be successful, a significant aspect of the intervention must include education and encouragement.

The interventions often found must successful in preventing repeat births are those that combine contraceptive use and a focus on education with personalized mentorship. It is important to note that no single intervention has been identified as the most effective. Many programs deliver comprehensive services to the teen mother and her child, including case management (often by a social worker), nutritionist services, physician access, and contraception counseling (20). Raneri and Wiemann discuss that many of the previously mentioned risk factors are indeed amenable to intervention, but it is important to identify which ones fit the individual's characteristics. These especially include choice of long-acting contraception, future pregnancy intentions, and educational/occupational aspirations (17). Kirby et al. reiterated the importance of targeting these individual factors and point to the need for a wide range of agency involvement (61). This recommendation is exemplified in the success of the many interventions that utilize nurses, counselors, teachers, and nutritionists to reach the adolescent (1) (13) (22) (30) (43) (62). Home-visit interventions have also been found to be widely successful, so long as the intervention focused on encouraging goal setting and contraceptive use. These home visits allow for development of a deeper, trusting relationship between the adolescent and the mentor (39). Klerman et al. specified, though, that the mentor is especially successful if she is a nurse and not a

paraprofessional—the adolescents need to both be able to trust and relate to her and to also respect her as a health education authority. They are also ideal times for the intervening mentor to gauge whether or not the index pregnancy was intended and to adjust the program accordingly (39). The most widely referenced important point in the literature was that these interventions must be flexible to the needs of the individual mothers -- a 'one-size-fits-all' perspective will not be successful.

The vast literature summarily presents a multi-faceted picture of the motivations, risk factors, and consequences of teenage pregnancies. Inarguably, teenagers from low economic classes and of minority race/ethnicity have increased risk adolescent pregnancy. The environment—including peer group and parental support—in which an adolescent grows up has a strong influence on their motivations to remain non-pregnant, which is often an important indicator in risk of future pregnancy. Interventions that account for the environmental factors and individualize mentorship programs for each adolescent mother, as well as providing access to long-acting contraceptives, have been found to be most successful in this population. The issue of repeat pregnancy is unique among each individual, and scientific research needs to address that challenge as much as possible. Each teen comes from a different background, has a different set of risk factors, and suffers (or enjoys) different consequences from pregnancy within her life. Each case must be approached as such—not as a problem to be fixed, but as situation that requires adaptation and understanding. It is imperative that public health officials understand the context in which both pregnancy and repeat pregnancy is occurring in order to adapt interventions to the needs of the adolescents involved.

Given the ‘enigmatically elusive public health goal’ that is, adolescent repeat pregnancy, this study aims to illustrate a more detailed picture of the situation in the state of Georgia. As Georgia has one of the highest rates of repeat teen pregnancy, this public health conundrum is particularly relevant. Many of the adolescents who deliver children in this state seek family planning care after the first birth, and, furthermore, many receive supplemental food assistance from WIC (Women, Infants and Children) during their first pregnancy. As such, this study seeks to determine if having contact with the public health department through either WIC or family planning can be preventative of future repeat pregnancies. If yes, further research will identify variables that differentiate those who do seek WIC or family planning and who can the Georgia Department of Public Health target in efforts to increase utilization of these services and, indirectly, decrease the incidence of repeat teen pregnancy in this state.

CHAPTER II

REPEAT TEENAGE PREGNANCY IN GEORGIA: ARE WE MISSING INTERVENTION OPPORTUNITIES?

Bethany Ullrich Welstead

Hypothesis

Among adolescent mothers under the age of 18 and whose first birth was in 2008, attending at least one family planning visit will be protective against the occurrence of a rapid repeat birth (RRB).

Methods

This study was analyzed as a case control study. The primary outcome (the case) of consideration for this study was whether or not the woman had a RRB, defined as having a second birth within 24 months of the first. Controls were those women who had a first birth but who did not have a second birth within the 24 month timeframe. The exposure of interest was occurrence of one or more family planning visits the mother had between the first birth and the second one (if applicable). These family planning visits were assumed to be opportunities for the adolescents to interact with public health officials and obtain birth control. The more visits each woman had, the more likely she was receiving and using birth control. Hypothetically, these women would have decreased likelihood of a second birth. As there is a built-in bias towards more family planning visits for mothers who have longer inter-birth intervals, we categorized the family planning variable dichotomously (one or more family planning visits as compared to no family planning visits) to avoid skewed statistical results.

A Pearson's chi-square test was used to analyze the independence of the control variables across different categories of both the outcome and the exposure of interest. Bivariate logistic regression was utilized to test the relationship between the outcome of interest and each covariate. Those that were significant were included in a gold standard model along with all interaction terms between each covariate and the outcome. A chunk test was performed to determine if any interaction terms should be included in the model. The rest of the variables were eliminated using backwards elimination until all parameters in the model had statistical significance. Additional bivariate logistic regressions were performed between the exposure of interest (occurrence of one or more family planning visits) and each of the covariates as well. The variables that were significantly related to the exposure (and not already included in the model) were included individually in the intermediate model to check for confounding. Those that changed the parameter on the exposure of interest by more than 10% were considered confounders and left in the model. SAS 9.3 was employed to analyze the data. This study was approved by both the Georgia Department of Public Health Institutional Review Board and the Emory University Institutional Review Board.

Data

The dataset used in the analyses was obtained from the Georgia Department of Public Health and contained all recorded births to female adolescents under the age of 20 within the state between 2008 and 2010. The initial dataset included 80,447 observations describing 45,057 individual mothers with 160 variables. Each mother had an observation that included each individual birth and each visit she made to a family planning clinic. Each mother was tracked from her first family planning visit or her first birth through 2010,

unless she reached the age of 20 prior to the beginning of 2011. Any births prior to 2008 or after the mother's twentieth birthday were not included.

To create a dataset that accommodated the needs of the study, all observations in which the conception date for the second pregnancy is prior to the birth of the first child were deleted (n=26). Another observation was deleted because conception date of the third child was determined to be before delivery of the second child. Conception date was estimated based on reported gestational age plus thirty days in efforts to be conservative. All observations in which the first birth was not a singleton delivery were also deleted as the delivery of twins (or a higher plurality) was not considered comparable. One observation was removed because it was a duplicate entry. All dates were reformatted for calculations of intervals by a SAS algorithm. The resulting dataset contained 75,880 observations and 176 variables. As there was no variable to indicate the number of births that occurred to each woman, a count variable was created to total the number of distinct birth event dates associated with each mother. An additional variable was created to rank order the births for each mother by the date of occurrence. A second count variable was constructed for the number of family planning visits each mother had before giving birth to each child. To clarify, all family planning visits that occurred after the first birth would be included in the count of visits for the second birth. Similarly, all family planning visits that occurred after the second birth would be included in the count for the third birth (if one exists). This count variable tallied the family planning visits for each birth, and a separate variable was created to rank each visit in order of occurrence within each time period. As the original dataset only included the event dates of each individual birth, another variable was used to calculate the time between each birth for each mother in months. The data were checked for validity

of all timespans between the first and second birth less than 9 months. The smallest two lengths of time between births were 6.87 months and 7.38 months. The gestational age for these two births was 39 and 40 weeks, respectively and, therefore, were deemed inaccurate, and thus, these observations were omitted from analyses. All other intervals between births were 8 months or greater and considered reasonable, given the possibility of a preterm baby and conservative gestational age calculations. Finally, the data were collapsed to include one observation, accounting for multiple birth event dates and including the count of family planning visits, per mother. The resulting data set consisted of 44,575 observations of teen mothers and all their births.

To estimate the incidence of rapid repeat pregnancy (a secondary pregnancy within 2 years from delivery of the first child), it was necessary to limit the sample to those who had first births in 2008. However, it is important to note that a rapid repeat pregnancy can still occur to a mother in this population without being included in the data. For example, if the first birth occurred in May 2008 and the second pregnancy began April 2010, this pregnancy falls within the rapid repeat timespan. However, the birth would likely not occur until February 2011 and the mother would not be counted among those who had a repeat. To account for this, the outcome of interest was altered to be a RRB, defined as a birth within the first 24 months after previous delivery. Using this definition, all births that occurred in 2008 would allow for denotation of any second birth that occurred within 24 months. Also, it is important to account for the fact that the adolescent will not be included if she has a second birth after she turns 20 years of age. Thus, we limited the data set to only include mothers less than 17 years of age at first birth. Therefore, even if the mother was about to turn 18 when she delivered, she would still be only 19 at the second birth and so would be

accounted for in the data. The data set with this final limiting factor consisted of 5,607 individual observations and 83 variables.

Control variables selected from their prominence in the literature were included in the final dataset. All control variables included in the model were selected from the information provided at the first birth. The only characteristics considered for the second birth were whether or not the adolescent was 19 years old or less and if the second birth was within the 24 month timespan. To indicate if the birth was insured through a government assistance program, we categorized both those records that indicate receipt of Medicaid or other government aid as receiving government assistance. There was also a variable that indicated government assistance in the form of WIC. This was maintained separately as the former is an insurance mechanism and the latter is a nutrition source. The original dataset included the month during the pregnancy that the mother first sought prenatal care, and this was represented as an integer between 1 and 10. All mothers who sought care during or before the third month (first trimester) were flagged as having sought appropriate prenatal care. The gestational age of the baby for each birth was measured in weeks. All babies with a gestational age less than 37 weeks were coded as preterm. The age of the mother at each birth was included, and, per the literature, mothers less than age 16 were classified as young adolescents. The birth weight of the baby was measured in grams. A low birth weight indicator variable was created to denote a baby whose birth weight was less than 2500 grams. Race was categorized into four groups: non-Hispanic white, non-Hispanic black, Hispanic, and other. Because of the small number of individuals of "other" race / ethnicity, these were excluded from all analysis. Any subject who was classified as both white and Hispanic or both black and Hispanic was classified as Hispanic for the purpose of this study.

Results

Table I below presents the distribution of the control variables across the different possible outcomes variables - 2 or more births compared to only 1 birth, a RRB compared to no RRB (which includes mothers with a second birth that was outside of the two year time frame), and at least one family planning visit compared to no family planning visits. The four different categories for each variable comparison were tested for significant differences. For example, the four possible outcomes for age and second birth include younger than 16 and only one birth (14.23%), younger than 16 with two or more births (17.95%), 16 or older with only one birth (85.77%), and 16 or older with two or more births (82.05%). The chi-square value determined from the chi-square test reveals a p-value of .0018, indicating a significant difference between each category of birth across the age groups. Of those who met the requirements for inclusion (n=5,607), 1,330 adolescents (23.07%) had repeat births during the study period while still a teenager. Of these 1,330 births, 976 were RRBs, which account for 17.89% of all births.

Table I also reveals significant differences in the distribution of family planning across the different categories of birth. Of those who have a RRB, 23.05% attended family planning compared to 27.98% of those who did not experience RRB. This association immediately points to a relationship between family planning attendance and incidence of RRB. Notably, the associations that are significant across distributions of two or more births compared to only one birth are also significant for incidence of RRB compared no RRB. This finding is reasonable as RRB is a highly correlated subset of two or more births -- 75.1% of the births that were second order or higher were rapid repeats. Mother's age at first birth also fluctuates across categories of birth. Of those who had a RRB, 12.4% were under

the age of 16. The distribution of those who did not have a RRB seems to be more heavily toward younger ages, as 18% of these mothers are under the age of 16. Also interesting to note, the distribution of age at first birth does not seem to be affected by occurrence of family planning visits (17.8% of those who seek family planning and 16.77% of those who do not are under the age of 16 years). Marriage is also different across birth categories but not family planning. Of those who have an RRB, 8.23% are married compared to 5.97% of those who do not. Marriage does not differ across categories of family planning though. Conversely, the mother being a smoker does not differ across categories of birth, but it does significantly different by incidence of family planning. Those who do not attend family planning visits are more likely to smoke than those who do (6.13% v. 4.63%). Race, on the other hand, oscillates across categories of both birth and family planning. Those who have a RRB are also more likely to be on Medicaid (85.9% compared to 82.6%); those who do not visit a family planning clinic are also more likely to be on Medicaid (18.5% to 11.9%). Those with RRBs are less likely to have breast fed their first baby while still in the hospital 53.7% to 59.0%. Table I indicates that those who have a second birth are more likely to be non-Hispanic black (59.8% to 49.0%), whereas those who only have one birth are more likely to be either non-Hispanic white (32.6% v. 276.1%) or Hispanic (18.4% to 14.1%). Yet, the non-Hispanic black women are the only race/ethnicity who revealed an increase in proportion with incidence of a family planning visit (56.2% to 49.9%). It must be acknowledged that these are merely crude, bivariate associations between the outcome (or exposure) and each covariate, but they do provide insight into the fundamental relationships that serve as the basis for more complex analysis.

Marital status by ethnicity was analyzed using the same technique as the literature suggested an interaction between the two socio-contextual descriptors (Table II). The results suggest a significant difference among all three categories, with non-Hispanic white females having the highest percentage married, followed by Hispanic females and then non-Hispanic black females. Table III presents additional descriptive results, including the average number of family planning visits the adolescent moms had between the first birth and (if applicable) the second birth -- .895, with a minimum of 0 and maximum of 23. Notably, of those who attended family planning, the average was 3.3 visits. Similarly, the average month the women in this sample began prenatal care was 1.87 months. However, out of only those who did seek prenatal care, the average month that prenatal care began was noted to occur not until a little after the third month. The average gestational age for the babies born to these mothers was a little over 39 weeks, and their birth weight averaged at 3085 grams.

A total of 5,376 mothers are included in this analysis: 963 cases and 4,413 controls. If they had missing data on the event date of either the first or the second birth and, therefore, a birth interval could not be calculated, and 55 mothers were omitted. Bivariate logistic regressions between the outcome of interest, RRB, and each of the covariates are presented in Table IV. Occurrence of a family planning visit between pregnancies, age, marital status, Medicaid receipt, race/ethnicity and having breast fed the index baby were all found to be individually associated with RRB. As expected these relationships are all commensurate with those identified from crude chi-square analysis in Table I. Being married, being 16 years of age or older, receiving Medicaid insurance, and belonging to the non-Hispanic black ethnicity are all factors associated with increased probability of RRB. However, these are only crude associations as they do not control for any possible

confounding factors. The initial model included all these variables and interaction terms between each variable and the exposure variable. The model also included interaction terms between race/ethnicity and marital status. Non-Hispanic White was designated as the reference category for race.

Initial Model:

$$\text{Logit } P(RRB) = \alpha + \beta_1 (\text{Family Planning}) + \beta_2 (\text{Young}) + \beta_3 (\text{Married}) + \beta_4 (\text{Medicaid}) + \beta_5 (\text{Black}) + \beta_6 (\text{Hispanic}) + \beta_7 (\text{Breast Fed}) + \beta_8 (\text{Family Planning})*(\text{Young}) + \beta_9 (\text{Family Planning})* (\text{Married}) + \beta_{10} (\text{Family Planning})* (\text{Medicaid}) + \beta_{11} (\text{Family Planning})*(\text{Black}) + \beta_{12} (\text{Family Planning})*(\text{Hispanic}) + \beta_{13} (\text{Family Planning})*(\text{Breast Fed}) + \beta_{14} (\text{Marriage})*(\text{Black}) + \beta_{15} (\text{Marriage})*(\text{Hispanic})$$

The interaction terms between marital status and race were both dropped as they had respective p-values of .9713 (non-Hispanic black) and .7206 (Hispanic). A chunk test was conducted to test for the overall significance of the interaction terms between the covariates and the exposure of interest. Collectively, all five were found not significant, and they were dropped from the model. The intermediate model before backwards elimination is presented below.

Intermediate Model 1:

$$\text{Logit } P(RRB) = \alpha + \beta_1 (\text{Number FP visits}) + \beta_2 (\text{Young}) + \beta_3 (\text{Married}) + \beta_4 (\text{Medicaid}) + \beta_5 (\text{Black}) + \beta_6 (\text{Hispanic}) + \beta_7 (\text{Breast Fed})$$

Utilizing backwards elimination, the variable representing breast feeding the index baby was dropped as it had a p-value of .2880. After it was removed, the other six variables were all significant.

Intermediate Model 2:

Logit P(RRB) = $\alpha + \beta_1$ (Number FP visits) + β_2 (Young) + β_3 (Married) +β_4 (Medicaid) + β_5 (Black) + β_6(Hispanic)

where α = -2.073, β_1 = -.3419, β_2 = -.5485, β_3 = .7164, β_4 = .4428, β_5 = .5642, β_6 = -.5140

Bivariate logistic regressions were also conducted between the exposure of interest and each covariate (Table IV). Medicaid receipt, race, and tobacco use during the first pregnancy were all associated significantly with the exposure of interest at the .05 significance level. Both tobacco use and being married decreased the unadjusted odds of seeking family planning assistance. Being non-Hispanic black or receiving Medicaid increased the crude odds of seeking family planning, though. Adequate prenatal care during the first pregnancy and utilization of WIC during the first pregnancy were both associated with the exposure at the .10 significance level. Each of these variables that were not already in the model was added individually to determine if they confounded the relationship between the exposure of interest and the outcome. Confounding was determined to be present if the parameter of the exposure variable changed by more than 10% dependent upon whether that covariate was in the model. Tobacco use, utilization of WIC, and adequate prenatal care were all checked, and none were identified as confounders.

Final Model:

Logit P(RRB) = $\alpha + \beta_1$ (Number FP visits) + β_2 (Young) + β_3 (Married) +β_4 (Medicaid) + β_5 (Black) + β_6(Hispanic)

where α = -2.073, β_1 = -.3419, β_2 = -.5485, β_3 = .7164, β_4 = .4428, β_5 = .5642, β_6 = -.5140

The adjusted odds ratios from the final multivariate logistic regression present a more complete picture of the effect of each individual variable on the likelihood of rapid repeat birth. A family planning visit reduces the odds of a rapid repeat birth by 29% after controlling for age, marital status, Medicaid reception, and race. Being under the age of 15 and/or of Hispanic ethnicity (in comparison to non-Hispanic white) both reduce the odds of rapid repeat birth by slightly more than 40% after controlling for all the other variables. On the other hand, being married slightly more than doubled the odds of RRB in the adjusted model. Receiving Medicaid and being non-Hispanic black (instead of non-Hispanic white) increases the odds of rapid repeat birth by 56% and 76% respectively, ceteris paribus.

Discussion

The results of the final model demonstrate, in this dataset, that having at least one family planning visit after the first birth is a protective factor against RRB. This finding is consistent with the hypothesis of this study. Family planning visits are most likely utilized so that these mothers can obtain birth control, and so it is reasonable that this would help guard against RRB. Unlike the majority of the literature, very young age at first birth (less than 16) is also protective against rapid repeat birth, with an odds ratio of .582. This is likely due to the sample this study analyzed. As previously mentioned, it is plausible that previous studies found young age to be correlated with repeat teen birth because these adolescents would have a longer risk period as they would have more time as teens in which to become pregnant again. In this study, however, the outcome was limited to rapid repeat birth, and the population was restricted to only those who had the full 24 months period to potentially have a second pregnancy while in their teenage years. This should be examined in further studies as it represents a possible widespread misconception in risk factors for repeat teen

pregnancy. Being married, on Medicaid, or of non-Hispanic black ethnicity has the opposite effect on likelihood of rapid repeat birth (OR = 2.047, 1.557, 1.758, respectively). The results indicate that being married doubles the likelihood of a rapid repeat birth, which is comparable to the results reported in the literature. This result is reasonable as those couples who are married are more likely to desire a second child to continue their family. Medicaid insurance is also predictive of rapid repeat birth, and, as Medicaid receipt is used as a proxy for low socioeconomic status, it is likely that increased poverty is contributing to the significance of this variable with the odds are increased by approximately 56%. Finally, both categories of race were significantly related to the outcome. The mothers who are non-Hispanic black have an increased risk of rapid repeat birth compared to the mothers who were non-Hispanic white (OR = 1.76). This too is commensurate with the literature. However, a mother of Hispanic ethnicity was nearly half as likely to have a rapid repeat birth as a non-Hispanic white female, and this is opposite from the majority of the results reported in other studies. It is likely that our results are different because only 17.4% of our study population was Hispanic, whereas the samples were primarily Hispanic in many other studies. Interestingly, the direction of the effect for each covariate on the outcome does not change between the bivariate and multivariate regressions. However, the effect of marriage on the outcome increases by almost 60% when controlling for race, age, and Medicaid. This could be because the reference category is non-Hispanic white, and those of this race also have a higher incidence of marriage in this study sample. Since this is a case-control study, the technical interpretation of each odds ratio would be the odds of a covariate (being black, for example), given a rapid repeat birth. However, this definition is more difficult to interpret and apply. In 1951, Cornfield addressed this interpretation problem and determined

that odds ratios in case-control studies could be used to estimate relative risk (63). Using this theory, the results from the current investigation could be interpreted as each family planning visit reduces the relative risk of having a repeat pregnancy by 29%.

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TABLES

Table I. Distribution of Covariate Percentages Across Categories of the Outcome and Exposure

Class		2+ births (n=1330)	1 birth (n=4277)	p-value	RRB** (n=976)	No RRB (n=4468)	p-value	FP > 0 (n=1520)	FP = 0 (n=4087)	p-value
RRB	No	76.49	100		0	100		84.92	81.28	.0018
	Yes	23.51	0		100	0		15.08	18.72	
FP Visits	No	75.88	71.95	.0053	76.95	72.02	.0018	0	100	
	Yes	24.12	28.05		23.05	27.98		100	0	
Age	>16	85.77	82.05	.0018	87.64	81.94	<.0001	82.20	83.23	.3711
	≤15	14.23	17.95		12.36	18.06		17.80	16.77	
Married*	No	92.14	94.11	.0112	91.77	94.03	.0092	94.15	93.44	.3375
	Yes	7.86	5.89		8.23	5.97		5.85	6.56	
Race*	White	26.11	32.56	<.0001	26.64	32.00	<.0001	27.82	32.21	.0002
	Black	59.81	49.01		59.22	49.87		56.19	49.88	
	Hisp	14.08	18.43		14.14	18.13		15.99	17.91	
Prenatal Care*	No	63.85	62.13	.2626	63.75	62.27	.9417	64.47	61.83	.0744
	Yes	36.15	37.87		36.25	37.73		35.53	38.17	
Preterm*	No	85.46	84.67	.4862	85.77	84.67	.3786	84.31	85.07	.4846
	Yes	14.54	10.83		14.23	15.33		15.69	14.93	
Low Birth Weight*	No	87.67	89.17	.1344	87.44	89.10	.1372	87.77	89.19	.1409
	Yes	12.33	10.83		12.56	10.90		12.23	10.81	
WIC*	No	15.57	16.46	.5052	15.08	16.50	.3454	14.52	16.91	.0611
	Yes	84.43	83.54		84.92	83.50		85.18	83.09	
Medicaid*	No	14.14	17.39	.0139	86.21	82.78	.0204	11.86	18.47	<.000
	Yes	85.86	82.61		13.79	17.22		88.14	81.53	
Breast Fed*	No	59.00	53.70	.0070	58.47	54.25	.0554	56.90	54.26	.1587
	Yes	41.00	46.30		41.53	45.75		43.10	45.74	
Tobacco*	No	94.21	94.30	.9003	93.81	94.39	.4773	95.37	93.87	.0345
	Yes	5.79	5.70		6.19	5.61		4.63	6.13	

*These data were obtained from birth certificate information about the first birth.

**RRB is a rapid repeat birth defined as a delivery of a 2nd birth that is within 24 months of the delivery of the first pregnancy.

Table II. Marital Status by Race / Ethnicity

Race/Ethnicity	Married (%)	Single (%)
Non-Hispanic White	216 (13.29)	1409 (86.71)
Non-Hispanic Black	15 (.55)	2691 (99.45)
Hispanic	99 (10.83)	815 (89.17)
Total	330 (6.29)	4915 (93.71)

Table III. Descriptive Statistics for Selected Covariates

Covariates	Mean (Std. Dev.)	Range
Number Family Planning Visits	.895 (2.127)	[0, 23]
Gestational Age	39.234 (2.695)	[20, 44]
Month Prenatal Care Began	1.866 (2.154)	[0, 9]
Birth Weight	3085.53 (564.397)	[283, 7229]

Table IV. Bivariate Logistic Regressions between RRB and Covariates

Control	Intercept	Parameter	P-value	Odds Ratio [95% CI]
Family Planning Visit	-1.392	-.294	.0003	.745 [.635, .875]
Young (<15)	-1.454	-.451	<.0001	.637 [.518, .783]
Married	-1.5474	.345	.0098	1.412 [1.087, 1.834]
Medicaid	-1.714	.274	.0157	1.315 [1.053, 1.643]
NH Black	-1.741	.358	<.0001	1.430 [1.203, 1.700]
Hispanic		-.710	.007	.491 [.326, .742]
Tobacco Use	-1.527	.112	.4511	1.118 [.836, 1.496]
Preterm Index Birth**	-1.509	-.089	.3821	.915 [.751, 1.116]
WIC	-1.618	.114	.3136	1.121 [.898, 1.398]
Sufficient Prenatal Care	-1.499	-.064	.3873	.938 [.812, 1.084]
Low birth weight	-1.542	.168	.1218	1.183 [.956, 1.464]
Breast Fed in Hospital	-1.4093	-.1776	.0475	.837 [.702, .998]

*Young is a dichotomous variable created from the mother's age at first birth.

**Preterm is a dichotomous variable created from the gestational age of first birth.

Table V. Bivariate Logistic Regression Between Family Planning Visit(s) and Covariates

Control	Intercept	Parameter	P-value	Odds Ratio [95% CI]
Young (<15)*	-1.002	.0718	.3711	1.074 [.918, 1.258]
Married	-.9794	-.1231	.3377	.884 [.687, 1.137]
Medicaid	-1.365	.5212	<.0001	1.684 [1.383, 2.051]
NH Black	-1.13	.2586	.0005	1.295 [1.120, 1.498]
Hispanic	***	.2592	.0488	1.296 [1.001, 1.677]
Tobacco Use	-.973	-.2966	.0352	.743 [.564, .980]
Preterm Index Birth**	-.998	.059	.4845	1.061 [.899, 1.252]
WIC	-1.105	.181	.0613	1.198 [.991, 1.448]
Adequate Prenatal Care	-.948	-.113	.0745	.893 [.788, 1.011]
Low Birth Weight	-1.005	.039	.1441	1.149 [.955. 1.384]
Breast Fed in Hospital	-.852	-.107	.1587	.899 [.774, 1.043]

***NH Black and Hispanic are dummy variables and so share the same intercept.

Table VI. Effect Measure of Individual Covariates on Rapid Repeat Birth in Final Model

Variable	Adjusted Odds Ratio [95% CI]
Family Planning	.710 [.584, .864]
Young (<16 years)	.578 [.446, .749]
Married	2.047 [1.420, 2.951]
Medicaid	1.557 [1.160, 2.089]
Non-Hispanic Black	1.758 [1.438, 2.150]
Hispanic	.598 [.358, .999]

CHAPTER III

This study provides a more detailed picture of repeat adolescent pregnancy in the state of Georgia between 2008 and 2010. These adolescent mothers will face a particularly unique set of challenges beyond those that are common for their age group because they are faced with the job of raising a child (or two). This study illuminates a few of the risk factors, like socioeconomic status, and race/ethnicity, which increase their risk for teenage pregnancy and magnify the challenges they will face post-delivery. However, there are more, less tangible obstacles with which they must also contend.

When examining the role of teenage pregnancy in current society and public health, it is especially important to understand the evolution of this role through the decades. Both Furstenberg and SmithBattle have pointed out that, ironically, adolescent motherhood only rose to the forefront of societal concern after teenage birth rates began to decline in the 1970s (23) (66). However, although birth rates were declining, the proportion of adolescent females who were raising their own children began to substantially increase. The traditional "shotgun wedding" solution that "fixed" a pregnant adolescent female's situation became more obsolete, and social attention began to problematize unwed teenage mothers raising children. The societal construction of unmarried adolescent motherhood was initially only morally repugnant, but as teenage parenting became a more common phenomenon, this idea shifted toward psychological inadequacy and, ultimately, health degradation (65). Framing teenage pregnancy into a paradigm of health consciousness and using medical terminology to describe it perpetuates the concept of its etiology -- that exposure to certain risk factors can lead to this disease and it must be treated as such. The etiologic disease of teenage pregnancy is legitimized for scientific investigation, unlike the moral violation. Even when

the attention is on the psychological aspects that lead to teenage pregnancy, the focus is not on an actual psychological deficit or illness but is defined instead as a behavior that does not properly reside within the accepted societal structures. As Cherrington candidly stated, "This is not a new strategy. Historically, a number of 'deviant' behaviors by women have 'required' such intervention (65)." She further concludes that even when teenage pregnancy is considered in light of the negative social outcomes that can occur, upon closer inspection, the rhetoric still focuses on individual behaviors that occur outside traditional societal mores. Bonell acknowledged that ample research does support adverse events from adolescent pregnancies in younger teenagers, a fact often used to support scientific examination of this issue. However, he notes that most adolescent pregnancies occur in older teenagers for whom there is not as much compelling evidence of deleterious outcomes. There is evidence for the harm caused by the low socioeconomic status that often permeates the lives of these women, but this is not a direct outcome from teenage pregnancy. Instead, "it is one mediated by, and contingent on, how society responds to teenage mothers and their children via health and social care, education, training, and welfare provision (64)."

Federal legislation first began to address impoverished single mothers and their children in 1950 when Aid to Dependent Children (a Social Security Act passed in 1935) was expanded to include dependent children of impoverished, single mothers (beyond the children of widows who were previously covered) (66). However, the numbers of divorced and never-married mothers staying home to care for their children, taking advantage of the new transfer payments, increased the number of middle class mothers who were forced to work. Concurrently, the idea that mothers on welfare were mostly black women incentivized by the system to have children, stay single, and avoid work began to germinate and spread

in the conservative framework (67). In the same era, the federal government also took initiative in the arena of health services and family planning. During the Carter Administration, Senator Edward Kennedy, a Democrat from Massachusetts, successfully introduced the Adolescent Health Services and Pregnancy Prevention and Care Act in 1978. This law granted funds for health programs that would oversee provision of all services that pregnant and parenting adolescents might need in order to effectively contribute to society; access to family planning services was a mandatory component of the services.

Three years later, in 1981, the Act was repealed under the Reagan Administration and replaced with a similar but more conservative and more pro-family piece of legislation. This Adolescent Family Life Act (AFLS) had as its primary goal to prevent first pregnancies among teenagers -- manifested in abstinence only sexual education (26). At Kennedy's persistent requests, only one-third of the grants provided under the act could fund abstinence-only education programs; the remainder had to support comprehensive family planning services. Despite continued heated debate over which prevention methodology was more appropriate in preventing teenage pregnancies, AFLA was primarily responsible for care of pregnant and parenting adolescents.

In 1996, Congress enacted massively influential legislation in the form of a welfare reform law, the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), and created Temporary Assistance for Needy Families (TANF) that also established new funding for abstinence only education (26). This extensive overhaul of the welfare system aimed to promote paid work and marriage for these single mothers, based on the theory that this would alleviate the high rate of poverty rampant in that part of the population (23). The new welfare law included changes that restricted benefits to unmarried

teenagers with children and required states to design a strategic plan to reduce teen and out-of-wedlock pregnancies, which were viewed as "critical social concerns (68)." The new legislation specifically targets adolescent mothers with two requirements. Firstly, in order to receive federal assistance, teen moms were required to live either at home with parents or in an alternative supervised setting residing with another adult. Teen mothers were also required to either attend school or a pre-approved training program within 3 months of giving birth. Only a year later, Congress waived the requirement that two-thirds of AFLA funding apply only to comprehensive education; consequently, the majority of AFLA funding, $15 million out of a total $19 million, was allocated to programs that embraced the strict, eight-pronged definition of abstinence-only education. In this environment, contraception is only allowed to be referenced in terms of its failure rates.

Federal policy has a vast effect on the lives of mothering adolescents and their children, but studies examining the effect of welfare reform provide mixed conclusions whether it is helpful or harmful. Using nationwide fertility data from the National Center for Health Statistics, Lopoo et al. determined that since the passage of the welfare reform, there has been a documentable decrease in fertility among those under 18 by 22 percent (69). The authors attribute this to the success of the welfare reform in reducing the "net benefit" of non-marital birth as it restricted young mother's access to federal transfer payments. However, others attribute the success in reduction of teen pregnancy rates to the concurrent upturn in the economy, as teenage pregnancy is also associated with poverty (26). Still others refer to the increased availability and utilization of long-acting contraception (20) (70). Since the passage of TANF, there has been a reduction in the proportion of teenage mothers who are claiming welfare, alongside an increase of those living at home and

attending school. However, it has also been determined that many mothers have been denied services or penalized for not complying with the requirements, and yet they received no help in increasing their ability to comply (6). The provision within the reform legislation that mothers must either be in a training program or attend school is victim to the presupposition that these mothers do not have any educational liabilities or barriers with which they must contend. SmithBattle notes that "even academically motivated teens drop out in the face of unreliable childcare, transportation, and exclusionary school policies (66)." Furthermore, nearly 60% of teen mothers dropped out prior to becoming pregnant, and these adolescents are far more likely than their peers to be suffering from a depressive disorder or an undiagnosed learning disorder -- both conditions that make school attendance difficult, if they are allowed to re-enroll after their absence (71) (72). As mentioned previously, there has been a decrease in adolescent birth rates over the past fifteen years (1) (73). Notably, the decreased rate in teenage pregnancy does not include a decrease in repeat teen birth rates. As such, even if the welfare reform is successful in preventing first order teen pregnancy, it is only increasing the number of obstacles adolescents who are already mothers must overcome, and providing them no assistance to meet these imposed standards. The concept of welfare was designed to provide assistance to those in need -- not to provide another tool with which to pass judgment on their actions and further complicate their life.

Furthermore, abstinence-only education lacks scientific evidence of its success in reduction of teenage sexual activity or pregnancy (26) (68). Moreover, a federal review that occurred in 2003 actually determined that many abstinence-only education programs were providing misleading information on all other forms of pregnancy prevention -- including false statistics on contraceptive effectiveness and abortion risks (68). It must be

acknowledged that abstinence from sexual intercourse will undoubtedly prevent both teenage pregnancy and problematic sexually transmitted infections (STIs) for the adolescent. However, most adolescents begin experimenting with sexual activity and intercourse during their teenage years, and it is unlikely that a focus on abstinence-only education within schools would influence many to choose this challenging path if it was not something they had chosen independently already. Even of those who make virginity pledges, which theoretically indicate somewhat of an internal desire to remain abstinent, only 12% actually wait until marriage to engage in sexual activity (68). Of particular interest, these youth are far more likely to engage in unprotected sex, increasing their risk for pregnancy and STI contraction (45).

On the other hand, comprehensive sexual education does not significantly contribute to increased frequency of sexual activity or an earlier sexual debut, despite widespread political claims of the opposite (68). In fact, studies comparing results in adolescents who received abstinence-only education to those who received comprehensive sexual education found that those receiving comprehensive education had a 50% decreased risk of having a teenage pregnancy (74). Another study found that abstinence-only education was not correlated at all with an adolescent having engaged in vaginal intercourse but comprehensive education actually was -- with an adjusted odds ratio of .70 -- meaning the odds of having had sexual intercourse were actually reduced for those who had comprehensive education (74). This result is reasonable as another study attributed 75% of the decline in teen pregnancy to greater improved contraceptive use (26). Between 2002 and 2005, four separate reviews conducted by the National Campaign to Prevent Teen Pregnancy in 2002, Advocates for Youth in 2003, Child Trends in 2002, and the

Sociometrics Corporation in 2004 evaluated sexual education programs and their success in affecting teen behavior. None of the four identified a single program utilizing abstinence-only education as successful. The fifty programs that the four reviews collectively deemed as successful utilized comprehensive education (75). Whether or not comprehensive education is actually protective against early adolescent sexual debut, it is widely touted as beneficial in reducing risky sexual behavior among teenagers. Yet, the push for abstinence-only education has not abated. The explanation intimates the current intertwining of faith-based and evidence-based health policies, a "step back in time to the colonial system of church-administered relief, a system that viewed immorality as a primary cause of poverty (51) (75)," Designing interventions and structuring health programs that promote a moral agenda in the name of public health threatens to undo the decline in teenage pregnancy for which proponents of these policies already claim credit.

The negative connotation of teen sexuality and reproduction is further bolstered through the focus of much published research. Bonell conducted a fascinating systematic review comparing literature from the United Kingdom and literature from the United States (64). He concluded that the American studies took a much harsher stance toward individual fault and the cost on society, whereas the British studies were more apt to analyze the occurrence of teen pregnancy as a socially-mediated phenomenon that should be investigated primarily for potential adverse health effects on the mother or child. Nearly one-third of the studies from the United States justified their research into teenage pregnancy by its harmful effect on the likelihood of the mother to be able to get married or stay married. Only one of twelve UK studies took this stance (64). While growing up in a two-parent household has been identified as protective against long-term economic and

social struggles, this situation results not from the marriage itself, but from the stability that a healthy family life can provide. In other words, marriage for the sake of marriage is not productive -- and yet, that is the focus of much of the American literature; it appears to be more about conforming to society's expected standards for an appropriate lifestyle. This is corroborated by the fact that a few of the American studies that Bonell identified actually describe teenage pregnancy as "deviant" and use that to explain why it is important to examine (64). Even the American studies that did focus on cultural influences of teen pregnancy "appeared to do so not in order to identify mechanism of economic influence, but rather to identify those social groups that, because of cultural factors, are able to control their fertility, and those that are not (64) (57)."

Bonell's findings are not the only ones along this vein. SmithBattle has pointed to the many downstream policies that define the American approach to teen pregnancy. She adamantly proclaims that elevated adolescent birth rates are the product of growing up socially disadvantage where means of improving one's status are perceived as nonexistent. And yet, even welfare policy now tries to enforce middle class expectations of living upon a population that cannot support them (66). Instead, policies need to focus on upstream mechanisms to reduce poverty and provide opportunities for these adolescents to establish a future that does not include early motherhood. Geronimus provides an overarching description of the problem of teenage pregnancy within the American paradigm -- "teenage pregnancy is more a political tool than a valid construct (76)." In order to successfully address the "problem" of teenage pregnancy, policy needs to be developed that addresses the actual problem -- poverty and lack of life improvement opportunities -- and does not just

attack symptoms of the problem, like teenage pregnancy.

APPENDICES

APPENDIX A. Tabulated Literature Review

Study	Intervention	Sample of Women	Design	Repeat Pregnancy	Correlates	Comments/Notes
Katz et al. (2011)	Girl Talk: Counselors conducted weekly 45 minute phone sessions; Weekly, first 6 mo. Biweekly, next 12 mo.	15-19 yrs. pg/pr* in RI N=249	Prospective Cohort	24 mo: 31% (I) 24 mo: 36% (C)	*Increased intensity of intervention for those 15-17 years	Survival analysis found teens found intervention significantly decreased time to pregnancy in all teens and teens under 18.
Schaffer et al. (2012)	MVNA: Public health nurse develops relationship with participant through home visit, providing support for expectant mother and education about her new role.	15-19 pg/pr In DC (2005-2009) N=748	Prospective cohort	Intervention: 3% Comparison: 4%		*Utilized resiliency theory to increase protective factors *Comparison group was all repeat pregnancy in metropolitan area, which included MVNA participants *76% of participants had sufficient prenatal care compared to 68% of all teens

Schaffer et al. (2008)	Pregnancy-Free Club: Alternative school setting for pg/pr Public health nurses present during day to educate on labor, parenting, child development, reproductive health. Monthly pregnancy test.	Alternative school participants (1998-2007) N=276	Longitudinal	98-99: 0% 99-00: 10.3% 00-01: 4.1% 01-02: 3.8% 02-03: 1.9% 03-04: 4.2% 04-05: 8.5% 05-06: 7.9% 06-07: 4.9%		*May not be generalizable as teens attending alternate school might make up unique sample

Omar et al. (2008)	Young Parents Program: is a clinical health service that provided comprehensive care to both mother and child. They saw the same physician at each appointment, and their treatment team included physicians, nurses, social workers, nutritionists, and pspychologists at every visit.	11-19 at time of first preg. who participated for 3+ years (1999-2003) N=1386	Retrospective cohort	36 mon: .79%	*No repeat pregnancy for DMPA users	*Long-acting contraceptive is encouraged and teens with financial needs are provided them for free.
Coard et al. (2000)	Participants in clinic received care from interdisciplinary health care team. Services for mothers aimed to promote effective contraception use, positive parenting, and completion of education.	First time adolescent (aged 17 or younger) mothers recruited between 1 and 16 weeks postpartum. N=80	Retrospective	12 mo.: 17.5% 24 mo.: 34.8%	*At 12 month:, contraceptive method *At 24 months: contraceptive use, maternal age, history of miscarriage and contraceptive method	*Concluded that efforts to prevent pregnancy should focus on monitoring contraceptive use regularity and encouraging long-acting contraceptives

Sant'Anna et al. (2006)	Integral Support Program for the Pregnant Teenager: provides open discuss bimonthly for pregnant and parenting teens with social workers, pediatricians, psychologists, physical therapists, pregnant teenagers, their partners, and adolescent mothers who participated during their pregnancy.	11-18, pg/pr, Santa Casa de Sao Paulo, Brazil (2002-2006) N=85	Prospective	23 mo: 3.52%	*all repeats came from single-parent households and had same partner	*Of those who dropped out of school, 79.4% occurred before pregnancy. *12 months after birth, 67.5% in school, 50% employed *While only l27.6% of adolescents used contraceptives correctly before intervention, 98.7% did after
Key et al. (2006)	The Second Chance Club: A high-school based intervention that included weekly meeting throughout school year on parenting, career planning, and adolescent struggles, home visits, medical care for adolescent and infant, and service projects	Pg/pr teens at urban high school who chose to participate N=50 Controls, N=255	Retrospective cohort	36 mo: 6% (I) 36 mo: 36% (C)		*Due to small sample size, the study could not identify statistical difference between participants considered active and those considered inactive.

Barnet et al. (2007)	This intervention utilized trained home visitors to mentor the adolescent through her child's second birthd, encouraging contraception use, education completion, and good parenting skills.	12-18, pg, predominantly low income and African-American, Baltimore (2001-2003) N-40 Controls, N=44	Case-control	24 mo: 45% (I) 24 mo: 38% (C)		*Repeat pregnancy percentages differed from repeat birth percentages, Intervention: 13%, Control: 19%
Black et al. (2006)	The intervention group received home visits biweekly visits from assigned mentor—a college educated, single mother—until the infant's first birthday (about 19 visits).	<18, Black, low-income adolescent mothers, delivered in urban hospitals in Baltimore	Randomized Controlled Trial	24 mo: 11% (I) 24 mo: 24% (C)	*At 24 months, mothers who second child reported romantic involvement and residence with first infant's father. *No difference in marital rates, contraceptive practices or risk taking	

Elster et al. (1987)	Teen Mother and Child Program: Intervention provides svcs incl medical, psych & nutritional to preg or parenting adolescents. Moms & infants receive svcs for 2 yrs, & svcs tailored to unique needs of parenting adolescents.	Intervention group includes consecutive women under age of 18 who entered the TMCP (January 1983-July 1984)	Prospective Cohort	26 mo: 29% (I) 26 mo: 39% (C)	*Pregnancy outcomes identical between intervention and control, but there was greater rate of compliance to prenatal care in intervention group	*95% of participants are eligible for supplemental food coupons through WIC>
Gray et al. (200^	Nursing Family Partnership: randomized 1 arm of trial to receive home visits to preg & parenting teens from RNs; aim - to improve preg outcomes by improving mom health prior to del, educate re: child health & dev, & help women develop vision for their futures.	<20, medically indigent women who visits prenatal clinics in Colorado (1994-1995	Retrospective	6 mo.: 8.3% 12 mo.: 18.4% 24 mo.: 28.1%	At each follow up, teenagers who were pregnant again were less likely to report regular contraceptive use during the previous 6 months. However, the nurses did not document any transition from protected to unprotected intercourse	

Stevens-Simon et al. (2001)	Colorado Adolescent Maternity Program (CAMP): provides healthcare for the adolescent mother and her infant, combined with home visits, social worker contact, and dietician advisement. Nine visits were scheduled the first year post delivery and four the year after that.	13-19 year old women, primarily Medicaid recipients, identifying CAMP as primary healthcare provider N=254	Retrospective Cohort	6 mo.: 7% 12 mo.: 14% 24 mo.: 35%	The contraceptive choices teen moms made had most substantial effect on occurrence of repeat preg. At 6 mo, rate of repeat was 0%, 4%, 14%, & 23% for those who used Norplant, Depo-Provera, birth control pills, & no birth control. At 12 mo rates were 0%, 11%, 25% & 38%.	The attrition rate in this study was high—by the end of the two year follow up period, the study had lost 87 (23%) of its participants. Notably, 89.8% of the teenagers reported using contraception during the puerperium
Klerman et al	Teen Parent Welfare Demonstration: utilized case management, educational workshops, training and employment services, childcare, and transportation assistance for the mothers. Program participation was required for services	Adolescent mothers with 1 child receiving welfare for the first time in Camden, Newark, or Chicago (1987) (75.3% Black) N=2234	Retrospective Cohort	No significant differences btw interventions & controls at either the Newark or Camden site. In Chicago, control group had a longer time to repeat preg than intervention group.		

Klerman et al.	New Chance: utilized case management, education and training workshops, childcare and transportation assistance, and employment preparation for parenting teens. Participation was voluntary.	Adolescent mothers under 19 who have not finished high school and are one welfare. 16 sites in 10 states. (1989) N=1399	Retrospective Cohort	There were no significant differences between the controls and the intervention group in regards to time to pregnancy. (p=.6087)		

Akinbami et al (2001)	Teen-Tot Clinic: provided well-child health visits, nutrition counseling, WIC, contraception access, and assistance with education, employment, and housing .	Parenting adolescents under the age of 17, referred from urban hospitals (1982) N=35, N (Control) = 70	Prospective Cohort	Cases: 18 months, 16% Controls: 18 months, 38%		They also found that 91% of the cases (vs .46% of controls) had their children fully immunized at 6 months and 97 % (versus 83%) were between the 5th and 95th growth percentile.
Rabin et al. (1991)	Queens Hospital Center Intervention: included a 24 hour "on-call" comprehensive services on site for the adolescent mother and child—including mental health, WIC, a housing office, day care, and a high school degree program. It also included a component through which the could have access to an interdisciplinary team of experts at any time.	Parenting adolescents under the age of 20, recruited from a clinical adolescent program. (1991) N=498 N(Control)= 91	Cohort	Cases, 9% Controls, 70%		This intervention also increased school attendance, as 77% of the participants reported attending school compared to only 38% of the controls. Furthermore, 95% of the participants graduated from high school.

O'Sullivan et al (1992)	Special Care Program Intervention: consisted of well-baby visits (and reminders if participants forgot the appointment). A social worker was onsite to make referrals to a birth control clinic, and the health care provided inquired about mother's plans to complete education. There was also health education in the waiting room.	Mothers under the age of 18, recruited form urban teaching hospital. All mothers unwed, on Medicaid, and black. (1992) N=120 N(Controls) = 123	Prospective Cohort	Cases, 12% Controls, 26%		There was no statistical difference in the number of cases and controls who returned to school after birth. There was a difference in immunization rate, cases at 30% versus controls at 18%.

Sangalang et al. (2006)	Adolescent Parenting Program: aims for 2ndary preg prevention for teen moms (until after grad hs school). APP is located in 30 different counties in NC, & provides case mgt and svcs to mom that will lead to economic self-sufficiency. Program holds peer group mtgs monthly & have contact with their case managers 1 x wk.	First time pregnant women age 18 or younger. (2006) N=1260 N(Controls) = 1260		Cases, 38% Controls, 38%		Participation in APP was significantly associated with the baby's gestational age at birth and baby's birth weight. The APP group did have significantly longer time to second pregnancies.

Thurman et al. (2007)	Determine difference in repeat pregnancy rate among adolescent mothers dependent upon their choice of birth control, evaluated by telephone interview conducted every 3 months.	11-19 year old postpartum teens. N (DMPA) = 142 N (patch) = 55 N (OCP) = 55	Prospective cohort	At 12 months: DMPA: 14.2% OCP: 29.7% OCP: 31.8% (p= .02)	Age was found to be significantly associated with repeat pregnancy. 14.3% of those between 13-16 had repeat, 17.8% of those 17-18, and 32.7% of 19 year olds (p=.05).	Condom use was low across all cohorts. Also 29.8% of the mothers had an STI

*pg/pr = pregnant or parenting

Study	Sample	Repeat Birth Rate	Correlates	Comments/Notes
Richio et. Al (2010)	Adolescents ≤ 19 in Rhode Island, birth in 2004 N=899	Cesarean, 17.4% Vaginal, 15.6%		Time to repeat birth for cesarean delivery was 20 months and vaginal was 17.6 months, although no statistical significance was determined.
Boardman et al (2006)	Used 2002 National Survey of Family Growth and analyzed teens (aged 19 or younger) who had a child N=1117	Intended, 180 Unintended, 354 No repeat, 583	Factors associated with intended RRP include single-parent household background (ROR 1.66), intended first pregnancy, (ROR=3.27), poor first pregnancy outcome (ROR=2.36). Factors associated with RRP being unintended included being Catholic (ROR =.50) or having no identified religious affiliation (ROR = .50)	Compared with adolescents without repeat pregnancy, those with repeat pregnancy were more likely to come from single family households.
Kershaw et al. (2006)	Recruited pregnant and non-pregnant adolescents through ten community health centers, primarily Latina and African-American N=354	Pregnant, 167 Non-pregnant, 187	The adolescents who were pregnant at baseline 6 times more likely to not have had sex in 12 month study period and 2.2 times more likely to consistently user two forms of contraception than adolescents who were not pregnant at baseline.	

Raneri et al, (2007)	Adolescent mothers aged 12-18 years at a labor and delivery unit in Texas (1993-1996) N=581	42% (24 months)	In multivariate logistic regression model, seven variables significantly predicted repeat pregnancy—planning to have a second baby within 5 years, not having started a long-acting contraceptive by 3 months postpartum, no longer in relationship with first baby's father, index baby's father more than 3 years older, those who had experienced intimate partner violence, not being in school at 3 months postpartum, and half or more of friends also parents.	Used social ecological theory as a foundation

Falk et al (2006)	Mothers between ages of 15 and 19 teenagers delivering first child at Orebro University Hospital in Sweden (1996-2000). N=250	25%		Of these teenage mothers, 6% had had a previous spontaneoua abortion and 17% had had a previous legal abortion.
Kelly et al (2005)	13-21 year old mothers, participants in CAMP intervention, followed for three months postpartum N=267		By the end of the third month after delivery, 58% of the teen mothers had resumed sexual activity (median time to sexual activity was 10.7 weeks). 80% of these women used a contraceptive method during resumed sexual activity	
Bhattacharya et al (2005)	Women who had c-swction btw 1980 & 1995, & who had not additional preg by 2000 were considered cases.		Absence of conception after first birth was primarily voluntary for women, regardless of delivery mode of first birth	Although the question of delivery mode was promising, this article does not directly apply to teen pregnancy, except to indicate delivery mode likely does not affect repeat pregnancy.
Godeau et al. (2008)	A sample 15 year-old students in 24 countries (2002 N=33943		%ages of students who had sexual intercourse ranged from a high in England (37.6%) & a low in Croatia (14.1%) Of those that had, 82.3% had used birth control (either condom and/or pills at last intercourse). Condoms were most popular choice of birth control (52.7% -89.2%). However 13.2% of teens used no method of birth control at last intercourse.	

Jacoby et al. (1999)	Women, aged 13-21, who chronologically received prenatal care at an independent, non-profit hc. (June 1994-June 1996) N=100	12 months, 43.6% 18 months, 63.2%	The experience of any form of physical, emotional, or sexual violence was significantly positively associated with RRP (OR = 3.46, p =.01). Spontaneous abortion of the first pregnancy was most strongly associated with a rapid repeat pregnancy (OR – 22.6, p <.00001). It is also notable that of those participants who reported abuse, 42.3% also spontaneously aborted (compared to 16.2% of non-abused peers) suggesting that the two risk factors are interconnected.	This article claims it is a case-control study but never actually describes the controls and how they were selected.