Research Article

Psychological, social, and spiritual effects of contraceptive steroid hormones

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Governments and society have accepted and enthusiastically promoted contraception, especially contraceptive steroid hormones, as the means of assuring optimal timing and number of births, an undoubted health benefit, but they seldom advert to their limitations and side effects. This article reviews the literature on the psychological, social, and spiritual impact of contraceptive steroid use. While the widespread use of contraceptive steroid hormones has expanded life style and career choices for many women, their impact on the women's well-being, emotions, social relationships, and spirituality is seldom mentioned by advocates, and negative effects are often downplayed. When mentioned at all, depression and hypoactive sexual desire are usually treated symptomatically rather than discontinuing their most frequent pharmacological cause, the contraceptive. The rising incidence of premarital sex and cohabitation and decreased marriage rates parallel the use of contraceptive steroids as does decreased church attendance and/or reduced acceptance of Church teaching among Catholics.

Lay summary: *While there is wide, societal acceptance of hormonal contraceptives to space births, their physical side effects are often downplayed and their impact on emotions and life styles are largely unexamined. Coincidental to the use of "the pill" there has been an increase in depression, low sexual desire, "hook-ups," cohabitation, delay of marriage and childbearing, and among Catholics, decreased church attendance and reduced religious practice. Fertility is not a disease. Birth spacing can be achieved by natural means, and the many undesirable effects of contraception avoided.*

Keywords: Contraception, Contraceptive steroids, Marriage, Cohabitation, Divorce, Altered mate choice, Hypoactive sexual desire, Depression, Religiosity

INTRODUCTION

Governments and society have accepted and enthusiastically promoted contraception, especially contraceptive steroid hormones, to facilitate optimal timing and

number of births, an undoubted health benefit. To this end the Affordable Care Act (ACA) mandates that all contraceptive steroid hormone formulations, as well as all other Food and Drug Administration (FDA) approved contraceptive

commodities, be made available without cost to any insured beneficiary. The American Congress of Obstetricians and Gynecologists (ACOG) echoes and reinforces the recommendations of the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) to include contraceptive steroids in their preventive care armamentarium (ACOG 2013). The Society for Adolescent Health and Medicine (2014) as well as the American Academy of Pediatrics (Ott 2014) followed suit, stressing LARCs (long-acting reversible contraception) particularly for women 15–19 years of age (Secura et al. 2010). LARCs include intramuscular injections of 150 mg of medroxyprogesterone acetate (Depo Provera) every 3 months, etonogestrel (Implanon, Nexplanon) implants, intrauterine devices (IUDs) infiltrated with levonorgestrel and copper IUDs. Recently Sayana Press, a prefilled syringe of 104 mg of medroxyprogesterone acetate for subcutaneous administration was introduced for developing countries.

None of the above committee opinions or position papers enumerate side effects but suggest counseling of patients before prescribing the modalities. The FDA list of serious side effects for etonogestrel covers every organ system¹ and is similar to product information for all contraceptive steroids. The high rates of discontinuation of contraceptive steroid hormones often led to unplanned pregnancies, sadly about half were aborted (Mosher, Jones, and Abma 2012). In Britain 66 percent of women who received abortions between 2011 and 2013 at the British Pregnancy Advisory Service (BPAS 2014) were using contraception in the conception month: 40 percent of these were using contraceptive pills inconsistently. BPAS reports that “many women are unhappy with the pill because of side effects,” without specifying a number or

proportion. The physical side effects of contraceptive steroids are well known and have been well described (Cortés and Alfaro 2014; Peck and Norris 2012). To counter the high discontinuations, the National Institutes of Health (NIH) issued a 3 million dollar request for applications to produce non-hormonal contraceptives (NIH 2013).

While the physical side effects of contraceptive steroids on every organ system will be described in other issues of this journal, the personal, social, and spiritual effects of hormonal, and in fact any, contraception limit the sexual partners' commitment. This is not primarily a religious issue.² As youth initiate sexual activity much earlier, teen pregnancy and the rising incidence of sexually transmitted infections and diseases are major public health concerns. The 2011 Youth Risk Behavior Surveillance study reports that 27.8 percent of female ninth-grade students had experienced sexual intercourse, 43 percent of tenth graders, 51.9 percent of eleventh graders, and 63.9 percent of twelfth-grade female students (Eaton et al. 2012). Of these, 33.7 percent had intercourse within the past 3 months, and 18 percent had used the birth control pill at their last intercourse (Martínez, Copen, and Abma 2011). This (low) level of oral contraceptive (OC) use prompted energetic advocacy of LARCs and “dual methods” (male or female condoms in addition to female contraceptives) by practice committees of the American Congress of Obstetricians and Gynecologists (ACOG 2012), the Society for Adolescent Health and Medicine (SAHM 2014) and AAP (American Academy of Pediatrics [Ott et al. 2014]) to reduce teen pregnancy and sexually transmitted infections and related diseases. Despite the public perception that “all” women use contraception, the National Survey of Family Growth reports that among women 15–45

years of age in union (i.e., sexually active) 62 percent were currently using any contraceptive. Of these, 17 percent were using OCs (Jones, Mosher, and Daniels 2012).

It is clear that every woman in the USA is not currently ingesting contraceptive steroid hormones, yet the political debate surrounding the contraceptive mandate of the ACA implies that the steroids are essential for women's health, regardless of side effects.³ Many of the articles reviewed on the effects of contraception on emotional and social parameters equate contraception or any method of birth control with the use of contraceptive steroids, while steroidal contraceptives accounted for 42 percent of modalities used. An additional 5.6 percent of women used an IUD, but the data do not distinguish between hormonal and non-hormonal devices (Sonfield et al. 2013).

In view of the aforementioned evidence, the objective of this article is to review the literature on the psychological, social, and spiritual impact of contraceptive steroid use. The intrapersonal effects nearly always affect a woman's social and spiritual functioning. The social effects in turn are often grounded in physical and psychological causes. We will, in turn, examine the effects of contraceptive steroid hormones on: (1) brain structure, (2) emotions and behavior, (3) their pharmacological impact on partner/spouse selection, (4) the demographics of contraceptive steroid use on marriage, family building, divorce and career choices of women, and (5) religious determinants of use/non-use of steroidal contraceptives.

SEARCH FOR BIBLIOGRAPHIC INFORMATION

The following databases were searched: PubMed, ABI/INFORM, PsycINFO,

Psych net, Google Scholar, Embase, Cinahl, Committee Opinions of the American College of Obstetricians and Gynecologists, Religion Database, and Serials (published by the American Theological Library Association), and CARA Research Archives (Center for Applied Research in the Apostolate). Google Chrome was the search engine used. Topics searched were effects of contraceptive steroid use on emotions, sexual behavior, cohabitation, marriage, partner choice, duration, career choices, and child-bearing, separation, divorce, single motherhood, and church attendance. PubMed Search 1: ("Psychology" [Mesh] OR psychology) AND ("Natural Family Planning Methods"[Mesh] OR "Rhythm method"; Search 2: ("Catholicism" [Mesh] OR "Christianity" [Mesh] OR Christian *OR Catholic*) AND (Natural Family Planning Methods [Mesh] OR "rhythm method" OR "natural family planning"). Fifty-seven studies were reviewed. Those selected were pertinent to the topic of the paper, the data were scientifically documented and were less than 5 years old unless the article was seminal. The selected articles had a sample size of at least 100 with the exception of three relevant smaller, well-performed studies whose results were relevant.

THE IMPACT OF CONTRACEPTIVE STEROIDS ON BRAIN STRUCTURE

Pediatric neuroimaging studies (Giedd et al. 1999) beginning in 1990 showed that organizational brain changes such as neural pruning and remodeling of neural pathways, among other changes, take place rapidly between 15 and 19 years of age, while the realignment of executive function pathways from the midbrain to the prefrontal cortex usually is not completed until the mid-twenties.

To resolve inconsistencies in reported sex differences in human brain structure Pletzer and her group (Pletzer et al. 2010) obtained high resolution structural images of the brains of fourteen young healthy men, fourteen young healthy women who did not use hormonal contraception, and fourteen women who used contraception. The women who were cycling naturally were scanned in mid-follicular and mid-luteal cycle phases, while the contraceptive users and the men were scanned once. Voxel-based morphometry was used to determine regional gray matter volumes. The following differences emerged: "men had larger hippocampi, parahippocampal and fusiform gyri, amygdalae, and basal ganglia than women." The gray matter of the prefrontal cortex and the pre- and post-frontal gyri of the normally cycling women were larger than the men's but these sex-dependent effects were modulated by menstrual cycle phases and hormonal contraceptives. The right frontal fusiform/parahippocampal gyrus contained larger volumes of gray matter during the early follicular than during the mid-luteal phase, suggesting the influence of higher amounts of estrogens (mainly estradiol). Contraceptive users showed significantly larger prefrontal cortices, pre- and post-central gyri, parahippocampal and fusiform gyri, and temporal regions compared to the women who were not using contraceptives.

Relating morphological changes to behavior is still largely based on animal studies, however in human fMRI (functional magnetic resonance imaging) studies, the fusiform and parahippocampal gyri have been implicated in spatial navigation abilities. The decrease in volume in these gyri during ovulation might explain hormone-dependent changes in women. Pletzer et al. offer no further interpretation, but hormones, especially sex steroid hormones, play important roles in the

pubertal pruning and neural remodeling. Exogenous and endogenous hormones can retard or arrest it (Vigil et al. 2011). In view of the emotional lability of the teen years with their alternating impulsive and rational behaviors, the choice of whether, when, and with whom to engage in sexual activity can be profoundly influenced by the addition of contraceptive steroids and can lead to lasting consequences.

EFFECT OF STEROID HORMONES ON MATE SELECTION

The highly polymorphic genes of the major histocompatibility complexes (MHC genes) found in house mice and humans not only control immunological self/nonself discrimination, which is important in tissue rejection and immune recognition of infectious diseases, but also play a key role in odor preferences. The latter was significant when forty-nine women whose MHC types were known were presented with T-shirts which had been worn by forty-four men, whose HLA-A, -B, and -DR MHC types were also known. The women were presented with six T-shirts. The odors of shirts worn by men of divergent MHC types were judged more pleasant than those worn by MHC-similar men. This supported the hypothesis that mate choice is designed by nature to avoid inbreeding. A subsequent study reported in the same article found similar outcomes among non-medicated subjects, but women who were using the contraceptive pill were attracted to the odors of the shirts of men with similar, rather than complementary MHCs. In other words, use of the contraceptive pill reversed the expected attraction to (putative) mates with divergent MHC types to those with similar MHC types (Wedekind and Penn 2000). While the role of pheromones in mediating the perception of

smells is generally accepted, their role in chemical communication is still controversial.

As hormonal contraceptives affect partner choice which impacts subsequent relationship satisfaction, offspring quality, and the well-being of women and mothers, Alexandra Alvergne and Virpi Lummaa, behavioral anthropologists, urge drug companies to investigate these parameters on a large scale (Alvergne and Lummaa 2010). They believe that women have dual sexuality: conceptive which dominates during the fertile (estrogenic) phase, and nonconceptive which is dominant during times of infertility (prior to and after the fertile phase). They cite increasing evidence that women are more motivated to engage in extra-pair copulation at midcycle, with resultant 3.5 percent extra-pair paternity. While these can lead to genetically superior offspring, the social costs of infidelity are high for both the woman and the child. These behaviors are also dependent on social situations, i.e., arranged marriages, polygamous unions, or in cultures in which a widow must marry the deceased husband's brother, while another male may be more attractive, especially when the attraction is hormonally enhanced. The family planning literature is largely silent about the effects of contraceptive steroids on the behavioral and personal antecedents which affect the choices to engage in sexual intercourse, on entering into temporary or permanent liaisons, and on reaching emotional maturity.

During estrus normally cycling women have increased preferences for more facially and vocally masculine men, men whose scents signal dissimilar MHC. These preferences are voided by pill use which also leads to short-term as opposed to long-term relationships favored by non-pill users. Men, in turn, find women most attractive during estrus. The consequence

of maladaptive mate choice of an MHC-similar pair may lead to a higher rate of spontaneous abortion due to compromised immune function and/or decreased heterozygosity-related problems of offspring. As there has been no research to evaluate the quality and stability of relationships when contraceptive steroids are no longer influencing attractions, Alvergne and Lummaa's plea for manufacturers of contraceptive steroids to undertake such a study makes eminent sense as the woman may discover that the partner she chose or accepted while ingesting contraceptive steroids is not compatible with her when the effect is no longer present (Alvergne and Lummaa 2010).

THE IMPACT OF CONTRACEPTIVE STEROIDS ON EMOTIONS AND BEHAVIOR

For decades it has been suspected that hormonal contraceptives produce psychological alterations in user women, e.g., depression, mood changes, changes in libido and in the stability of affective relationships. Even though hormonal contraceptives such as OC are the most extensively studied drugs in the history of medicine (Hatcher 2007), little research has focused on determining the consequences of using these drugs on psychological well-being. Thus both the users as well as healthcare professionals are quite misinformed regarding these consequences (Cobey and Buunk 2012; Cortés and Alfaro 2014). Among the few studies conducted in this line, the most relevant are described as follows.

In 1969, Udry and Morris formally reported the prevalence of two side effects of hormonal contraceptive preparations on the lives of users: a decrease in the libido and depressive symptoms (Udry and Morris 1969). Several years later, Oinonen and Mazmanian (2002) studied the

relationship between affect and duration of OC use in ninety-six women (17 first-time OC users, thirty-four long-time users, and forty-five never users). They compared early-, late-, and never-users of OC regarding positive affect variability, and personal and family psychiatric history. Triphasic contraceptive users experienced greater variability in positive affect across the menstrual cycle, likely due to the variable steroid hormone levels. Withdrawal of constant level of hormones (monophasic contraceptives) during early use was associated with greater variability in positive affect than withdrawal of changing hormonal levels (triphasic contraceptives). A personal or familial psychiatric history enhanced the variability and negative effects of the OC. While many women using OC experience positive effects, the subgroup experienced a negative mood change. Later, a group of Italian researchers studied the psychological effect of a different OC formulation (drospirenone 3 mg plus ethinyl estradiol 30 µg) in a group of ten users compared to a control group ($n = 12$). In the third month of treatment they found that certain psychological symptoms (such as the intensity of anxiety, phobic anxiety, and paranoid ideation), evaluated by a psychometric scale, had decreased significantly in users of OC. The effect was attributed to the anxiolytic action of drospirenone sulfate when comparing with the control group. This led these researchers to propose the benefits of this formulation in reducing some psychological disorders (Paoletti et al. 2004).

The association between hormonal contraceptive use and mood disorders was studied in a random sample of 498 Norwegian women (Svendal et al. 2012). Of the total sample, 185 women (37%) were using contraceptive formulations at the time of assessment. Of these, 152 (82%) were using combined formulations of estrogens

and progestins, whereas thirty-three (18%) were using progestin-only contraceptive formulations. Among users with mood disorders, six (15%) were taking progestin-only formulations while five (13%) were taking combined contraceptive formulations. The women taking progestin-only contraceptive formulations had an increased likelihood of a current mood disorder, compared with women taking combined contraceptive formulations, who had a lower likelihood of a current mood disorder. As a whole, current users of progestin-only contraceptives were found to have a threefold increased risk of a current mood disorder, compared to non-progestin contraceptive users. A randomized, double-blinded, placebo-controlled trial was performed to determine whether the combined OC induce more mood disorders than placebo in users who had previously suffered from mood disorders induced by combined OC (Gingnell et al. 2013). Thirty-four women participated in this study: fourteen received a placebo while fourteen received a combined OC (containing levonorgestrel). An emotional face-matching task (versus geometrical shapes) was administered during fMRI prior to and during the combined-OC treatment cycle. Throughout the trial, users recorded daily symptom ratings on the Cyclicity Diagnoser scale. During the last week of the treatment cycle combined-OC users had higher scores of depressed mood, mood swings, and fatigue in comparison to placebo users. Combined-OC users also had lower emotion-induced reactivity in the left insula, left middle frontal gyrus, and bilateral inferior frontal gyri compared to placebo users. In comparison with their pretreatment cycle, the combined-OC group had diminished emotion-induced reactivity in the bilateral inferior frontal gyri, whereas placebo users had diminished reactivity in the right amygdala. Authors

concluded that combined-OC use in women who previously had suffered emotional side effects resulted in mood deterioration, and combined-OC use was also accompanied by changes in emotional brain reactivity.

Despite the uninterrupted availability of non-reproductive intercourse provided by contraception more and more women without antecedent psychiatric history experienced a reduction in libido. The syndrome of hypoactive sexual desire made its way into the DSM IV (American Psychiatric Association 1994) while few noted that it was most prevalent in women who were taking contraceptive steroids (Warnock et al. 2006). It is known that combined OC reduce levels of androgen, especially testosterone, by inhibiting ovarian and adrenal androgen synthesis and by increasing levels of sex hormone-binding globulin (SHBG) (Zimmerman et al. 2014). The explanation for this is that the principal function of SHBG has traditionally been considered to be that of a transport protein for sex steroids, regulating circulating concentrations of free (unbound) hormones and their transport to target tissues (Wallace et al. 2013). Considering that free and total testosterone are thought to be mainly responsible for libido, it is not a surprise that treatment with testosterone is usually offered and considered helpful (Wierman et al. 2014), but the binding effect of the steroids on SHBG continues even after discontinuation of the contraceptive steroids. Regrettably some clinicians are not yet persuaded of the above association and maintain their patients on contraceptive steroids while offering antidepressants and counseling to alleviate the complaint.

Oinonen and Mazmanian (2001), whose review was cited above, acknowledged that depression was the most frequently cited reason for discontinuation of the drug, which may be attributed to the

abolition of the natural hormonal cycle by monophasic contraceptives. Robinson et al. examined studies of increased depression, anger, anxiety, fatigue, use of tranquilizers, sexual dysfunction, divorce, and suicide and other accidental or violent deaths with current use of different hormonal formulations of contraceptive steroids and inert IUDs. They questioned whether the emotional disturbances resulted directly from the pharmacologic changes introduced, as different steroid formulations and the inert IUDs had similar effects. Even a study of “weak female hormones” vs. a placebo which was labeled as a contraceptive yielded a similar side-effect profile, suggesting that it is the practice of contraception itself which is responsible for the psychological effects (Robinson et al. 2004). A population-based study of West German women yielded mixed findings which did not attempt to distinguish physical from psychological effects: a questionnaire administered to current or past users of OC (1303), condoms (996), IUD (342), and 428 NFP users (some used the calendar method, others a symptothermal method), and sterilization (139) showed both positive and negative effects. Fears of anticipated side effects of pills and IUDs, concerns about unplanned pregnancies with NFP and condoms were negatives. Satisfaction was reported by 92 percent of sterilized women, 68 percent of OC ever users, 59 percent of IUD users, 43 percent of NFP users, and 30 percent of condom users. Nearly 33 percent of NFP users had experienced an unplanned pregnancy compared to 5 percent of condom users. Negative mood changes were reported by 16 percent of OC users, 23 percent of condom users, and 30 percent of NFP users, suggesting that many effects were a combination of fear, anxiety, and confidence in the method or its lack. It is possible that either the women and/or their partners had not received sufficient

follow-up support to become comfortable with their use of NFP (Oddens 1999). This interpretation was borne out by the authors' follow-up study which found that additional counseling allayed health concerns and led to improved compliance in the use of reversible methods (den Tonkelaar and Oddens 2001). The effects of contraceptive steroids on the cardiovascular, nervous, gastrointestinal, skeletal, immune, and genitourinary systems will be described in other issues of this journal.

It is worth noting that Graham and Sherwin (1992) found no beneficial effects of OC in women suffering from moderate to severe premenstrual symptoms such as mood disorders. Women who received OC reported decreased sexual interest after starting treatment, and this effect was independent of any adverse influence on mood.

THE DEMOGRAPHIC IMPACT OF CONTRACEPTIVE STEROID HORMONES ON WOMEN'S CAREERS, CONJUGAL RELATIONSHIPS, AND FAMILY BUILDING

The literature is replete with studies linking the effects of the pill on facilitating women's achieving higher education either by delaying marriage and childbearing, or avoiding marriage altogether. The pill allowed women to engage in sexual relations without fear of pregnancy, thus precluding expected interruption of careers or life plans. Curiously, Bailey (2006) refers to this as family planning services, even though the goal is to avoid starting a family.

Passage of the Twenty-Sixth Amendment to the US Constitution in 1971 reduced the legal age of majority from 21 years of age to 18. This change was soon reflected in state laws and allowed younger women to obtain contraceptives without parental consent. Soon most college health

services were prescribing the pill for their undergraduate students. The availability of the pill was seen as a supply-side explanation for the change in career plans: an increase in age of first marriage and an increase in the numbers of women entering professional schools, chiefly law, and medicine. Despite the widespread availability of the pill and a ratio of 8:1 of pill use vs. abortion, the abortion rate among 18- and 19-year-old college students who took the pill went from 5.3 percent in 1971 to 6.0 percent in 1976. The pill is not necessary for demographic change, at least it is not the sole agent. In Japan there was a decline in the fertility rate and increase in age at first marriage beginning in the early 1970s while the pill was not legally available until 1999 (Goldin and Katz 2002). The authors were apparently unaware that Japanese women made extensive use of abortion in that time frame. After abortion was (re)legalized in 1948, nearly 40 percent of married women had at least one abortion. The number has since stabilized between 20 and 30 percent (Sato and Iwasawa 2006).

The recent review by the Guttmacher Institute of relevant papers from 1980 to March 2012 details the positive effects of (predominantly) hormonal contraception on women's freedom to decide whether and when to have children, on educational attainment, workforce participation, economic stability, union formation and stability, mental health and happiness, and the well-being of children via adequate birth spacing. In the authors' view obtaining reliable contraception was the gateway to achieve all the above benefits and theoretically to counter the economic ill effects of single teenage childbearing and failure to complete high school. Both are acknowledged to keep low-income teens impoverished and tend to reduce women from higher income groups to poverty at least for some time (Sonfield et al. 2013).

While access to the pill is credited with increased workforce participation and the amount of time spent in the paid labor force including the professions, the results for mothers of small children vary. In dual-income households, married women have more flexibility to reduce their paid work or leave it entirely to care for small children.

Income disparities are closely linked to ability to participate in the workforce, which is contingent on the need to care for one or more children. While some job categories value experience more highly than educational achievement, over all the “family gap” perdures. The gender gap for childless women still exists: at age 30, childless women average 90 percent of the wages a 30-year-old man earns in comparable occupations, women with small children average 73 percent as much as men in similar jobs. Both men and women benefit financially from delaying family formation until later adulthood, but highly educated women are estimated to lose 21–33 percent of their lifetime earnings when they have children. Delaying childbirth until the late twenties and thirties raises income 4 percent, but does not address the non-monetary value of the satisfaction or the challenges of being a parent (Sonfield et al. 2013).

Marriage and family building would need to be delayed to achieve the above economic advantages, but needs for love and relationship often take precedence, and behaviors are more often driven by impulse than rational choice. Despite cultural messages to teens and young adults that sexual activity is normative as long as it is “protected,” currently 40 percent of pregnancies in the USA are unplanned (Mosher, Jones, and Abma 2012). When couples conceive while using contraception, this is always stressful. Among cohabiting couples “contraceptive failures” are not infrequently associated with

disharmony and abuse. Sadly many times the baby is aborted. Despite attempts to make abortion appear to be of no consequence (Advocates for Youth 2014) women must deal not only with the loss of the child, but with their responsibility and guilt for the act. Some women can grieve openly, but many choose psychologically destructive means of coping: substance abuse, depression, suicide. These often result in post-traumatic stress disorder, psychosomatic symptoms, or family dysfunction (Angelo 1992; Burke and Reardon 2007).

According to the National Survey of Family Growth, in 2006–2010, 40 percent of first premarital cohabitations among women transitioned to marriage by 3 years, 32 percent of these marriages remained intact, and 27 percent dissolved. Nearly 20 percent of women experienced a pregnancy in the first year of their first premarital cohabitation (Copen, Daniels, and Mosher 2013). Pregnancy clearly elicited a range of reactions from the parents depending not only on their economic aspirations but also on their maturity and commitment to their union. According to Sonfield et al. (2013) both married and cohabiting couples’ relationships dissolve more often when there is an unplanned pregnancy. This effect becomes stronger if there is an additional unplanned birth, or when parents disagree on the number of children they wish. While unplanned pregnancy was an independent factor for union instability, personality traits such as ability to communicate clearly affected the relationship. The higher rate of unintended pregnancy among teen parents affected union dissolution even more strongly.

Legal access to “the pill” coincided with a 30 percent reduction in new marriages and greatly increased cohabitation. By 2011, 60 percent of marriages were preceded by cohabitation (Wilcox 2012). While fewer women married, those who

married later were better educated and had fewer divorces. Conversely, the education of teen mothers is often interrupted or stopped by the need to care for the child. Many public and private assistance programs aim to support single, teen mothers with financial, personal, and educational assistance to become self-supporting. Currently teen mothers are especially targeted by the LARC programs, sponsors of which consider prevention of repeat pregnancy by teen mothers of paramount importance. Yet motivation for conception is far from uniform and ranges from unintended to highly intended. Highly intended pregnancies are conceived for a variety of reasons: desire for a baby can be highly immature, similar to wanting a doll, to wanting to punish one's mother or father for real or imagined slights, to wanting to marry the baby's father, to feeling inadequate as a person until one is a mother, to wanting a baby before biological motherhood becomes impossible as marriage had receded as an option, to search for community (Alvaré 2012).

Sonfield et al. (2013) view too early or unwanted (unintended) childbearing to be associated with maternal depression, anxiety, and a lower level of happiness, citing analyses of longitudinal studies of mother-child pairs, such as Barber's (2014). The terms "unwanted" and "unplanned" are used interchangeably and statically, overlooking the commonly found ambivalence about both planned and unplanned pregnancy in the first trimester, which often changes to positive acceptance by the time of birth. Studies cited show that early parenthood and low quality of life are associated with lower income and a lower quality of life later, even extending to poor mental health among U.S. and British women in menopausal years.

Children born to teen mothers or whose birth was unintended too often

suffer from the lack of competent and consistent nurturing on the part of immature, economically deprived, or depressed mothers resulting in poor developmental, educational, and economic outcomes. The antidote offered for these, and for too close birth intervals is contraception, preferably LARCs (Ricketts, Klingler, and Schwalberg 2014). While poor developmental outcomes of children born to teen mothers, or born "unwanted" is well known, these vary with the quality of support which the mothers and children receive from family and community. Sonfield et al. (2013) clearly view contraception as a panacea to avert all the bad outcomes described, but do acknowledge the positive role of antidiscrimination laws which make attainment of better education and subsequent careers possible for teenage mothers, mothers whose children are spaced too closely, or who are in other economically deprived situations, or are discriminated against on the basis of ethnicity.

For all these categories, contraception, more often than not by contraceptive steroids, is offered as the preventive. The basis of the mother's relationship with the baby's father only enters peripherally when either marriage, violence, or abuse are discussed. The economic benefits of delaying pregnancy until the mother has completed her education and is established in a career are lauded as positive outcomes for women's reproductive health, while acknowledging that abortion must always remain available as a secondary method to help women achieve the goals which the authors consider desirable. But few acknowledge that oocytes begin to lose potency by age 30, and that many women who have missed their optimal window of fertility resort to assisted reproductive technology (ART) to attempt pregnancy. While the business of ART is highly remunerative, in the best hands the

success rate is 40 percent. This has led to a variety of surrogacy arrangements which have reduced the child to a product (CDC, ASRM, and SRT 2013).

While Sonfield et al. (2013) and many others attribute to contraceptive use the fact that women can delay pregnancy and cite the positive effects of the pill on women's education and life-style choices, few link the concomitant rise of divorce to contraceptive use. In 1960 the U.S. divorce rate was 2.2/1,000 compared to 8.5/1,000 couples who married that year (Goldin and Katz 2002). In 2009, 3.5/1,000 couples divorced compared to 6.8/1,000 who married in that year. While the rate of divorce has increased, fewer couples marry as the rate of cohabitation has also risen (Infoplease 2007). Even though the rate curves for divorce and contraception can easily be superimposed, the academic community has not drawn the obvious conclusion nor has it adverted to the enormous social costs of divorce on the former spouses, their children, or society at large. Once a marriage is legally dissolved the state enters into many decisions concerning not only alimony but also the education and healthcare decisions for minor children. What was once the private decision of parents now involves the legal system and imposes constraints. While child custody arrangements vary from joint to sole custody, all children are impacted by the loss of the secure home which they had taken for granted until their parents separated. Some children are resilient, others develop emotional and/or physical illnesses, but no child is unaffected (Valero 2014). Similarly, children who are raised by a single parent, or cohabiting parents fare less well economically and personally than those raised by their married, biological parents (McLanahan and Jenks 2015; Thomson and McLanahan 2012). Shaunti Feldhahn states that divorce among church-going couples is 25

percent compared to 50 percent among couples who do not attend church (Barber 2014) but does not address denominational differences in respect to approval or disapproval of contraception. Among Catholics ever use of the contraceptive pill had no effect on divorce rates, while sterilization doubled the risk of divorce. Fehring believes that the finality of sterilization suggests an inability to live with one's fertility (Fehring 2014, 190–194) but data to support this belief are not (yet) available.

A more refined qualitative and quantitative study of spiritual well-being, self-esteem, and intimacy of couples compared twenty randomly selected Creighton Model NFP-user couples from a private university nursing center with twenty couples from another NFP center who had switched from NFP to artificial contraception at least 1 year prior to the study. Eight of the comparison group were currently using OCs, six used condoms, two used diaphragms, two used the contraceptive sponge, and two had been sterilized. While Student's *t* test results showed no significant differences between NFP users and contracepting couples in self-rated, self-esteem and intimacy scores, the NFP couples had statistically higher scores on spiritual, religious, and existential well-being (Fehring and Lawrence 1994). A survey of 1131 long-term users of the Roetzer sympto-thermal method (STM) of NFP in Austria, Germany, and Switzerland yielded a 43 percent return rate. The 37-item questionnaire was sent to current and former users. It covered gender, age, education, employment, finances, civil status number of children, religious confession, religious practice, and practice and consequences of living the STM method. Ninety percent of respondents had secondary or higher education. More than 30 percent had chosen STM because they

wanted a natural method, 22 percent had done so on the advice of friends. The same number chose NFP for ethical/religious reasons, while 15 percent feared side effects of hormonal methods. Consistent use of the Roetzer STM method was reported by 83 percent of respondents, who also reported high levels of church attendance and prayer as a couple. The twenty-five (3%) persons who were divorced after a median 12 years of marriage had fewer children (2) than the couples who remained married (3+). Religious confession was not related to the occurrence of divorce but was related to “non-optimal” religious practice and a 77 percent use of artificial birth control at some point in their marriage, compared to 40 percent use of those who remained married (Rhomborg, Rhomborg, and Weissenbach 2013).

IMPACT ON SPIRITUALITY

Spirituality is personal, but as many religious faiths have taken positions for or against the use of contraception, when the use of contraceptives conflicts with one's religious group's teaching one would expect to see effects. The Anglican church formally approved the use of contraceptives by married couples with Resolution 15 at the 1930 Conference of Anglican Bishops at Lambeth; most other Protestant groups did not take formal positions but accepted the practice tacitly (Notare 2008). The Catholic Church is the largest religious group to oppose the use of any method which renders the sexual act sterile either temporarily or permanently. Thanks to widespread opposition by clergy and laity, many were placed into a crisis of conscience when the encyclical *Humanae vitae* was issued in 1968, as many had already begun to use barrier contraceptives, withdrawal or the pill (Paul VI 1968, n. 17). The pill now

provided easy access to a non-coital method. Given the too often minimal clerical teaching, the question has become moot for many who consider themselves faithful, practicing members of their denomination. Since the advent of the pill, NFP use, according to the National Survey of Family Growth (NSFG) (Jones, Mosher, and Daniels 2012) is no higher than 0.08 percent of the 62 percent of the population who are using any method of family planning, and has not changed significantly in the last 20 years. There appears to be cognitive dissonance between Catholic use of artificial family planning methods and periodic abstinence as at least two thirds of each group of users consider the practice of their faith important and more than half of these attend church services weekly or more often.

A study of U.S. Hispanic Catholic women 15–44 years of age compared the influence of faith on their choice of family planning methods. While hormonal pills, male condoms, withdrawal, and vasectomy were used significantly less often, the IUD and Depo Provera were used more frequently than by non-Hispanic women. In the 2006–2010 NSFG, the percentage of Hispanic women who used periodic abstinence was 1.94 percent, double the 0.53 percent of white women, and 0 percent for black women; there was no difference in reported rates of abortion. The variation in method mix may well reflect the generally lower income levels of the Hispanics and their subsequent use of public-sector family planning providers (Rodriguez and Fehring 2012). Clearly the goal, to separate sex from procreation, was paramount while non-coital means were preferred. The study was not able to specify the motivation directing the choices as there was no information about the women's knowledge of Church teaching. An analysis of the NSFG data on contraceptive use by religious affiliation by Hill, Siwatu, and

Robinson (2013) postulated and demonstrated a preference for non-coital methods by members of religious groups, predominantly Catholic, who desired to avoid conception as well as prevent feelings of shame and condemnation by their communities. While feelings of shame about contraceptive use by Catholics were voiced more frequently after *Humane vitae* was issued in 1968, attempts at justifying its use by theologians such as Rev. Charles Curran, former professor of moral theology at the Catholic University of America, not only muted these expressions but have seemingly removed them (Hodges 2014).

Concurrently, membership in the Catholic Church in the U.S. has increased from 46.3 million in 1965 to 66.6 million in 2013, while weekly mass attendance declined from 55 percent to 24 percent (CARA).

Today nearly 27 percent of couples are cohabiting. Of these over 90 percent are using contraceptives (Jones, Mosher, and Daniels 2012). The data do not discriminate about participants' religious practice. Because Catholics were slower to accept contraceptives than their Protestant neighbors, their fertility was higher prior to the advent of non-coital methods, but with acceptance of current contraceptives the differences have disappeared (Borch, West, and Gauchat 2011), except for the Hispanic population whose fertility has remained higher than the non-Hispanics' for mainly religious reasons which tend to disappear with changes in income and education (Westhoff and Marshall 2010). Similar conclusions about contraceptive use among college-educated, Mexican-American women were reached by Alvarado and Nehring (2012). Hirsch (2008) conducted a qualitative study of older and younger Catholic women in rural Mexico and observed that the older women resisted the "modern methods" as they were heavily promoted by the government

in order to obtain U.S. funds for fertility reduction, while the younger women persuaded themselves that use of the "modern methods" was approved by God to ensure that they did not have more children than they could support. Some obtained permission from priests to that effect. Interestingly, a significant number of the younger women who tried to space children relied on natural methods, presumably calendar rhythm and withdrawal, while the older women had used prolonged lactation to lengthen birth intervals, often concluded by tubal ligation. Hirsch concluded "in Mexico [Catholicism] is not just something women practice with their heads and not their hearts, -they practice it with their whole bodies," but they employ "cultural creativity" to justify their reproductive practices (Hirsch 2008).

Currently 85 percent of church-going Catholic women in the U.S. are more open to additional children than their non-Catholic sisters, but believe that they are compliant with Catholic Church teaching while using contraceptives (Hasson 2014). Hasson suggests that catechesis on sex and procreation as well as conscience formation has lagged since *Humanae vitae* (Paul VI 1968).

While OC are consumed by women who are in relationships with men, men's attitudes have significant effects on whether women make use of the drugs. Hoga et al. (2014) found sixteen qualitative studies eligible for inclusion in their systematic review undertaken to facilitate the recommendation of the UN Conference on Population and Development held in Cairo in 1994, which sought to increase contraceptive access globally and also attempted to legalize universal access to abortion. The review found that religion, family, and social background are strong influences on contraceptive use, and that men's acceptance of contraceptive

responsibility was highest among Protestant Christians who were most likely to make use of condoms and vasectomy from a sense of responsibility for their families. These usages were not without ambivalence, which healthcare providers must deal with if contraceptive use is to expand (Hoga et al. 2014).

In conclusion, the availability of predominantly hormonal contraception has affected society profoundly. By facilitating the separation of sex from procreation, it has changed women's life styles to facilitate completion of their education or engaging in careers while either marrying but delaying childbirth, or cohabiting, or simply engaging in non-procreative intercourse. This freedom has also led to fewer or later marriages, more divorce, low sexual desire, and depression. For those whose religion proscribes the use of contraceptives, it has often led to diminished religious practice. All these changes were predicted by Pope Paul VI in *Humane vitae*, number 17 (Paul VI 1968).

DISCUSSION

In restricting payment for family planning services to FDA approved contraceptives and commodities or procedures which exclude fertility from any sexual encounter, the alleged health-serving goal of the ACAs (Patient Protection and Affordable Care Act. Sec.2953/513) contraceptive mandate, our government has legislatively decoupled sexual intercourse from procreation. Evidently the administration assumes that women want to include or exclude their fertility from any heterosexual encounters at will, and that they can do so without any personal, physical, emotional, or spiritual *sequelae*. The regulations which our Department of Health and Human Services (DHHS) has issued only consider reproduction-free sexual relations as

significant. The means to achieve this end are of no consequence, apparently, as only commodities are reimbursed. The National Institutes of Health (NIH) which are part of DHHS have recognized that the high number of women who discontinue the alleged boon of hormonal contraceptives because of the side effects which they encounter, and have unplanned pregnancies as a result, call for different approaches. They have issued a request (NIH 2013) for research for non-hormonal contraceptives. But they need look no further than NFP and will save taxpayer funds in the process. The natural biomarkers of fertility and infertility are not even considered in the regulations, yet these offer well documented, reliable, cost-free, and side-effect free options for procreative choice. Fertility is not a disease. Using a drug with the many untoward effects described in this article to sterilize sexual encounters in not only irrational, it is not good medicine.

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ENDNOTES

- 1 Food and Drug Administration product warnings and information (RX List 2015): Side effects: inflammation at the insertion site, symptoms of cerebral, pulmonary, cardiac or peripheral thrombotic or embolic episodes or hypertension, breast mass, icterus, or depression. Clinical trials with 942 women from several countries preceded approval of Implanon. Adverse reactions leading to discontinuation of treatment reported by more than 1% of subjects included irregularities of

- menstrual bleeding 11.1 percent, emotional lability 2.3 percent, weight increase 2.3 percent, headache 1.6 percent, acne 1.3 percent, depression 1 percent. In the subset of 330 U.S. subjects, 6.1 percent experienced emotional lability, and 2.4 percent reported depression. Adverse reactions which did not result in discontinuations reported by more than 5 percent of subjects included headaches 24.9 percent, vaginitis 14.55, weight increase 13.7 percent, acne 13.5 percent, mastodynia 12.8 percent, abdominal pain 10.9 percent, pharyngitis 10.55 percent, leukorrhea 9.6 percent, influenza-like symptoms 7.6 percent, dizziness 7.2 percent, dysmenorrhea 7.2 percent, back pain 6.8 percent, emotional lability 6.5 percent, nausea 6.4 percent, pain 5.6 percent, nervousness 5.6 percent, depression 5.5 percent, hypersensitivity 5.4 percent, and insertion site pain 5.2 percent. As post-marketing experience is based on voluntary reporting, the FDA cannot estimate their frequency or establish a causal relationship, but the list encompasses every organ system. Warnings and precautions in U.K. literature not mentioned in U.S. sources for etonogestrel include ectopic pregnancy in the event of contraceptive failure, which is considered to be more likely than intrauterine gestation, as progestins slow transport of the embryo in the fallopian tube. Implantation normally begins when the embryo is 5.5 days old; if the movement of the embryo is slowed, it will begin to implant in the tube.
- 2 Some years ago a psychologist from the NIH who had no religious affiliation came to me for instruction in the Billings Ovulation Method of NFP. She had already used mechanical and hormonal contraceptives, but responding to a comment I had made at an NIH meeting, decided to seek a natural method. After using the method for three months she told me 'this method is so different – now I can be all there, now I am not holding anything back.' The contrast between contraception and fertility-acceptance methods has never been explained more simply.
 - 3 The far greater incidence of thrombo-embolic episodes discovered subsequently and multiple lawsuits for over \$1.9 billion have dampened enthusiasm for this drug, which was heavily marketed as lacking the negative effects of the androgen-derived levonorgestrel contraceptives (Drugwatch 2014). Despite the numbers of women who have suffered or died from pulmonary emboli, myocardial infarction, or strokes, Yaz, Yasmin, and Ocella are still on the market.

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