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Determinants of Family Planning Service Uptake and Use of Contraceptives among Postpartum Women in Rural Uganda

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Determinants of Family Planning Service Uptake and Use of Contraceptives among Postpartum
Women in Rural Uganda

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Determinants of Family Planning Service Uptake and Use of Contraceptives among Postpartum
Women in Rural Uganda

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Abstract

Uganda is among the countries with the highest unmet needs for family planning, which is associated with both negative health outcomes for women. The present study was a cross-sectional secondary data analysis using Andersen's Behavioral Model of Health Service Use (ABM) as a theoretical framework to identifying factors influencing family planning service uptake and contraceptive use among postpartum women in rural Uganda. Participants were 258 women who attended antenatal care at a rural Ugandan hospital and completed an interview approximately 13 weeks postpartum. Bivariate logistic regression models in SPSS were used to test hypothesized ABM factors as determinants of family planning service uptake and contraceptive use postpartum. Variables that were statistically significant in the bivariate models were included in two separate multivariate hierarchical logistic regression analysis with the two outcomes. With all variables accounted for, statistically significant predictors of uptake of family planning services included: education (enabling factor) (AOR=3.03, 95% CI=1.57-5.83), prior use of contraceptives (predisposing factor) (AOR=7.15, 95% CI=1.58-32.37), partner communication about contraceptives (relationship factor) (AOR=1.80, 95% CI=1.36-2.37), and perceived need of contraceptives (need factor) (AOR=2.57, 95% CI=1.09-6.08). Statistically significant predictors of use of contraceptives since delivery included: education (enabling factor) (AOR=2.04, 95% CI=1.05-3.95), prior use of contraceptives (predisposing factor) (AOR=10.79, 95% CI=1.40-83.06), and partner communication about contraceptives (relationship factor) (AOR=1.81, 95% CI=1.34-2.44). These findings identify predisposing, enabling, relationship, and need factors in the ABM as key determinants of postpartum women's family planning service uptake and contraceptive use, and should be considered in antenatal and postnatal family planning counseling.

Introduction

Family planning is defined as the ability for individuals and couples to attain their desired number of children and plan the spacing and timing of their births through use of contraceptive methods (WHO, 2013). The benefits of family planning have become increasingly recognized worldwide, including improved health, economic, and social outcomes for women and families, as well as public health, economic, and environmental benefits at the population-level. At the individual-level, the health benefits for women and infants include the prevention of pregnancy-related health risks and deaths in women, reductions in infant mortality and the rate of unsafe abortions, the prevention of the transmission of HIV/AIDS from mother-to-child (PMTCT), and prevention of sexual transmission of HIV and sexually transmitted infections (STI) between partners (WHO, 2013). Family planning also has significant economic benefits for families and for society as a whole (Gribble, 2012). By slowing the growth of a population, women have more earning potential and families are able to devote more resources to each child, resulting in reductions of poverty (Gribble, 2012; UNFPA, 2005). Despite the known benefits of family planning, globally more than 120 million women aged 15 to 49 who are married or in a union have an unmet need for family planning (United Nations, 2011).

An unmet need for family planning refers to women capable of reproducing who are not using contraception, but wish to postpone their next birth or to stop childbearing all together (UBOS & IFC International Inc., 2012). According to the Guttmacher Institute (2010), meeting the unmet need for family planning and maternal and newborn health care in sub-Saharan Africa is estimated to result in a 69 percent reduction in maternal deaths and 57 percent drop in newborn deaths (2010). Women in developing nations are disproportionately affected by an unmet need for family planning, with the highest need in sub-Saharan Africa.

Uganda, one of the fastest growing countries in the world (UNPD, 2005), is especially in need of increased family planning services. Fertility rates are high at 6.2 children per woman overall and 6.8 children per woman in rural areas (UBOS & IFC International Inc., 2012) and in

2010 the country's annual population growth rate was 3.2%, the 5th highest globally (UNICEF, 2012). Among married women, 34.3% have an unmet need for family planning, with a higher unmet need in rural compared to urban areas (37% and 23%, respectively) (UBOS & IFC International Inc., 2012). In 2011, only 30% of currently married women were using contraceptives (UBOS & IFC International Inc., 2012) compared to a global average of 63% (United Nations Population Fund, 2010).

Among married women with an unmet need for family planning in Uganda, 13.5% are in need of limiting and 20.8% are in need of birth spacing (UBOS & IFC International Inc., 2012). Planning the spacing of births is critical; intervals shorter than 36 months are associated with an increased risk of neonatal and infant mortality, childhood malnutrition, and complications during pregnancy for women (Gribble, Murray, & Menotti, 2008; Rutstein, 2008). In Uganda, the majority of new pregnancies occur within this risky time period: approximately 26% of all births occur less than 24 months since the last pregnancy and 71% less than 36 months since the last pregnancy (Rutstein, 2011). Furthermore, an estimated 44% of all pregnancies in Uganda are unplanned and abortion rates are high (Guttmacher Institute, 2009; UBOS & IFC International Inc., 2012). Singh and colleagues (2006) estimate nearly four in ten (38%) unintended pregnancies result in abortion. Given that abortion is illegal in Uganda, high prevalence of abortion further illuminates the high demand, but limited means to avoid pregnancy among women. Unsafe abortions are estimated to be the cause of 21% of all maternal deaths in Uganda (Singh et al., 2006); it is estimated that if the unmet need for contraceptives were met in Uganda, unplanned births and unsafe abortions would decline by approximately 85% (Guttmacher Institute, 2009).

Literature Review

Andersen's Behavioral Model of Health Services Use

One important step in addressing the unmet need for family planning in Uganda is exploring factors influencing women's decisions to use or not use contraception. Early research

in this area focused mainly on individual-level determinants of contraceptive uptake, including individual characteristics, such socioeconomic and demographic factors (Stephenson et al., 2007), and psychosocial factors encompassed by theories of behavior change (Warriner et al., 2012). More recently, researchers have emphasized the importance of considering multilevel determinants of health behavior, including not only factors at the individual and interpersonal-level, but also contextual factors, such as community norms and environmental/structural barriers and facilitators to family planning access and utilization (Stephenson et al., 2007), especially in resource-limited settings (Campbell, 2003; Marks, 2008; Murray and Campbell, 2003). Such factors are encompassed in Andersen's Behavioral Model of Health Services Use (ABM, Andersen, 1968), a multilevel model developed to explain and predict health service use. The ABM was originally developed in the 1960s to explain health service use among families and has since undergone multiple revisions, changing the unit of analysis from families to individuals, and expanding the model to include both individual-level and broader contextual factors in the external environment and health care system (Andersen, 1995; Andersen & Davis, 2001; Andersen & Newman, 1973). A systematic review assessing the use and implementation of the model reported its extensive use to investigate utilization of health services in a broad range of settings and areas of the health care system, and in relation to a wide number of diseases and health outcomes (Babitsch, Gohl, & von Lengerke, 2012), including the uptake of maternal health services in resource-limited settings (Chakraborty et al., 2003).

The model conceptualizes the major components of health service use as those that predispose, enable, or suggest need for individual use of health services, while taking into account the influence of environmental factors on each of these three components (Andersen, 1995; Andersen & Davis, 2001; Andersen & Newman, 1973). See Figure 1 for a graphic depiction of the main components of the ABM. In sum, environmental (i.e., external environment and the health system) and person characteristics (i.e., predisposition of people to use services, factors that enable or impede this use, a person's perception of need for care) combine to

influence health behavior (i.e., personal health practices and health service use), which influence health status outcomes (i.e., perceived health status, evaluated health status, and consumer satisfaction). The model suggests an explanatory process or temporal ordering between the components to predict use, though each component of the model may make an independent contribution to predicting use (Andersen, 1995). Given the importance of multilevel factors, including individual (e.g., socio-demographic factors, knowledge, attitudes) and contextual determinants (e.g., health care access, cultural norms), on uptake of family planning services and contraceptive use in resource-limited settings, I modified the ABM (Andersen, 1995; Andersen & Newman, 1973) by adding relationship factors and used it as the framework to conceptualize determinants of contraceptive use and family planning service uptake in Uganda. In the following section, I discuss the family planning literature specific to determinants of family planning in developing countries with a focus on Uganda within the framework of the ABM. My focus is on contraceptive and family planning service utilization, therefore I exclude health status outcomes described in the model from the current discussion, making health behavior (personal health practices and health service use) the outcome of interest.

Andersen's Behavioral Model of Health Services Use and Contraceptive Use in Uganda

Environment

Health care system and external environment. The ABM includes factors in the health care system and external environment, including physical, political, and economic components, in its framework to explain the use of health services (Andersen, 1995). Throughout the literature in developing countries, economic underdevelopment and poverty are contextual factors identified as determinants of contraceptive use and the uptake of sexual health services (Parker, Easton, & Klein, 2000). The upstream factor of poverty is often manifested as structural barriers in the environment or health system. With limited health services available in many settings, especially in rural areas, proximity to the clinic is a major barrier to women (Okech, Wawire, & Mburu, 2011). In a Ugandan study, the most common

obstacle to contraceptives use identified among women was a lack of access to quality services (Kibuuka et al., 2009). Similarly, Ketende, Gupta, and Bessinger (2003) found proximity to a private health facility was positively associated with current contraceptive use among Ugandan women. Poverty is also manifested in different forms of financial barriers for individuals in accessing health care in resource limited settings, including the cost of transportation, cost of or difficulty in obtaining child care, cost of services, and opportunity costs from time lost at work (Parker, Easton, & Klein, 2000; Parkhurst, Rahman, & Ssengooba, 2006).

Even when women live in close proximity to a healthcare facility, the availability of a range of contraceptive methods and the quality of services may be lacking. Failure to provide universal access to contraceptives has been documented throughout resource-limited settings, with cases of contraceptive stock-out and limited choice in methods commonly reported, especially in rural areas (Ketende, Gupta, & Bessinger, 2003; Ross et al., 2001). Sub-Saharan Africa has been identified as having the least availability and the least variety of methods (Ross et al., 2001). Adequate supply includes not only the availability of contraceptives, but access to trained staff, protocols of treatment, follow-up care, cost, and the environment of health facilities (e.g., wait time, space) (Ensor & Cooper, 2004; Ketende, Gupta, & Bessinger, 2003).

Underdeveloped logistical systems leading to frequent contraceptive shortages are reported in Uganda, as is a shortage of skilled staff, and other health and social concerns competing for the limited resources available (Mukasa, 2009). Research in Uganda reports mistrust of service providers as a major barrier to accessing sexual health services (Flaherty, Kipp, & Mehangye, 2005; Kiene et al., 2013) and the presence of three or more service providers trained in providing integrated reproductive health services has been associated with contraceptive use (Ketende, Gupta, & Bessinger, 2003), highlighting the importance of skilled providers.

Person characteristics

Predisposing characteristics. Predisposing characteristics include demographic, social, and psychological factors that predispose individuals towards health service use or

nonuse (Andersen, 1995; Andersen & Newman, 1973). Biological factors such as age and sex are included in the model at this level (Andersen, 1995; Andersen & Newman, 1973). In support of the influence of such predisposing characteristics on health behavior, research indicates that younger adult women are more likely to use contraceptives than older adult women (Duong, Lee, & Binns, 2005; Okech, Wawire, & Mburu, 2011; Stephenson et al., 2007), which could be a reflection of less need for contraceptives or more traditional beliefs about family size and the lack of acceptability of contraceptive use among older women. However, contradictory data exists indicating contraceptive use may increase among older women after reaching their ideal family size or experiencing the economic burdens of childrearing (Agyei & Migadde, 1995), a notion supported by research demonstrating women with more children are more likely to use contraceptives (Okech, Wawire, & Mburu, 2011). In Uganda, contraceptive use increases with increasing levels of age, peaking at 38 (UBOS & IFC International Inc., 2012).

Other predisposing factors identified by Andersen (1995) include individual factors such as education, job status, ethnicity, family/relationship status, and religion. A sizable amount of evidence from both postpartum and non-postpartum samples exists to suggest women with higher education and literacy are more likely to use contraceptives than their less educated counterparts (Ainsworth, Beegle, & Nyamete, 1996; Ankomah, Anyanti, & Oladosu, 2011; Kulczycki, 2008; Okech, Wawire, & Mburu, 2011; UNFPA, 2010; Warren et al., 2013). The Uganda 2011 DHS report found contraceptive use increases with higher levels of education and number of children (UBOS & IFC International Inc., 2012). In sub-Saharan Africa, urban women are twice as likely to be using contraceptives than those in rural areas (34 percent versus 17 percent, respectively) (UNFPA, 2010), a pattern reflected in Uganda and across resource-limited settings (Lightbourne, 1980; UBOS & IFC International Inc., 2012). Furthermore, qualitative studies in Uganda indicate that one's religion has a strong influence on family planning; Ugandans identifying as both Catholic and Muslim cite their religion as a major reason

for not using contraceptives and for their desire for a large family (Beyeza-Kashesy et al., 2010; Kiene et al., 2013).

Mental health is also classified by Andersen (2001) as a predisposing characteristic, with poor mental health negatively influencing health service use. Studies lend support to the negative influence of poor mental health outcomes on condom use and sexual risk (DiClemente et al., 2001; Kennedy, 1993). These constructs have been studied more in the context of HIV risk behavior than in family planning, however, and less is known about how these factors influence contraceptive use for pregnancy prevention. One Ugandan study found depression among HIV positive individuals was associated with poor linkage to HIV care (Bhatia et al., 2011). Given women's risk for postpartum depression after recently giving birth, and high stress associated with this time period (Warren et al., 2006), this may be an important determinant of family planning service use to explore further.

Psychosocial factors related to health beliefs such as attitudes and knowledge related to health and health services are categorized in the ABM as factors that predispose one to health service use (Andersen, 1995; Andersen & Newman, 1973). Such factors are encompassed by theories of behavior change (e.g., Ajzen, 1985; Fishbein & Ajzen, 1975; Fisher & Fisher, 1992) and have been commonly employed to explain and predict contraceptive use and to develop interventions to increase contraceptive use (Warriner et al., 2012). Of the 30 existing psychosocial theories of behavior change (Michie et al., 2005) many are based on some form of social cognitive theory (Bandura, 1986), especially those focused on health behavior (Warriner et al., 2012). Social cognitive theory posits that the process through which people learn to adopt new behaviors includes gaining knowledge of the risks and benefits of behavior change, developing self-efficacy, assessing outcome expectations of the change in behavior, setting health goals and strategizing to realize those goals, and overcoming social and structural perceived impediments to health behavior change (Bandura, 1986; 2004).

A study among a nationally representative sample in Nigeria found misinformation about family planning to have a negative effect on contraceptive use and accurate information to have a positive effect on use (Ankomah, Anyanti, & Oladosu, 2011). Myths and misinformation negatively related to contraceptive use included the belief that contraception makes women become promiscuous, contraception causes cancer, and contraception is expensive (Ankomah, Anyanti, & Oladosu, 2011). A large body of qualitative research suggests similar myths about contraceptives are prevalent throughout sub-Saharan Africa and elsewhere, usually related to side effects, safety, and long-term effects on fertility (Chipeta, Chimwaza, & Kalilani-Phiri, 2010; Cornman et al., 2011; Williamson et al., 2009). Prior research at Gombe Hospital in Uganda, the site of the present research, found patients commonly believe that hormonal pills accumulate in the body, lead to “deformed children,” and cause cancer (Kiene & Lule, 2008). Moreover, the literature suggests accurate knowledge is positively associated with increased contraceptive use and intentions (e.g., Alvarez et al., 2010; Credé et al., 2012; Duong, Lee, & Binns, 2005; Kulczycki, 2008; Okech, Wawire, & Mburu, 2011). However, research in Uganda and elsewhere has demonstrated low use of contraceptives among populations with high knowledge, indicating that knowledge alone doesn’t necessarily translate to use (Chipeta, Chimwaza, & Kalilani-Phiri, 2010; UBOS & IFC International Inc., 2012).

Among women who have recently given birth, there may be specific knowledge gaps and fears about safety of contraceptive use specific to the postpartum time period. For example, in examining reasons for not using contraceptives six months postpartum among a sample of women in rural Vietnam, Duong, Lee, and Binn (2005) reported that 57% said they were unaware of the need for contraception postpartum and 9% were concerned about the effect of contraceptives on the quality of breast milk and/or their own health. Similar beliefs were reported from mixed methods research with postpartum women in Bangladesh (Salway & Nurani, 1998). Despite the desire to prolong the timing of their next pregnancy, women were reluctant to use contraceptives postpartum because they feared the effect of contraceptive use

on their health, which they felt was already vulnerable having just given birth, and they were aware of the decreased need for contraceptives during the postpartum amenorrhea interval, which is the period between childbirth and the return of menstruation which offers natural protection from pregnancy (Salway & Nurani, 1998). These authors also reported that the Bangladeshi women in their study were more likely to adopt hormonal methods of birth control after the introduction of supplements to the infant's diet, indicating the influence of breastfeeding and lactational amenorrhea on the timing on contraception adoption postpartum.

Correct information about the health benefits of contraceptives have been linked to more favorable attitudes towards contraceptive use (Odimegwu, 1999) and favorable attitudes towards contraceptives are positively related to contraceptive use (Eliason et al., 2013; Maharaj & Cleland, 2004; Salway & Nurani, 1998). For example, Maharaj and Cleland (2004) reported an association between the belief in the efficacy of condoms and condom use among South African women. Qualitative research among Ugandan youth found negative attitudes towards contraceptives based on beliefs that contraceptives interfere with fertility and cause reproductive health problems (Nalwadda et al., 2010). Negative attitudes towards condoms were also reported, and were based on the belief that condoms have an infectious lubricant and have been "purposely infected with HIV by Whites" (Nalwadda et al., 2010). A systematic review of qualitative studies across studies in sub-Saharan Africa and South-East Asia found similar negative beliefs; the association of condom use with disease and promiscuity and fears of side effects, especially infertility, with hormonal methods were prevalent (Williamson et al., 2009).

Enabling resources. Enabling resources in the ABM include personal and family resources, which can be financial, material, or social in nature, serving as conditions enabling service utilization (Andersen, 1995; Andersen & Newman, 1973). Personal income or wealth is considered a financial factor which enables health service use through one's ability to pay for health services and other related costs. The Uganda 2011 DHS indicates a positive relationship between contraceptive use and wealth (UBOS & IFC International Inc., 2012). While

contraceptives in Uganda are offered free to all women, other indirect costs, such as transportation to the clinic, childcare, and loss of time to work, are commonly cited as barriers to accessing different forms of health care in qualitative studies conducted in Uganda (Amuron et al., 2009; Geng et al., 2010; Mutyaba et al., 2007; Tuller et al., 2010), making income an important determinant to consider.

The ABM also identifies different forms of self-efficacy as enabling resources, such as the perceived ability to navigate the healthcare system and self-help skills (Gelberg, Andersen, & Leak, 2001). Self-efficacy, part of social cognitive theory and a key component in many other health behavior change theories, is defined as the belief that one can exercise control over their own health habits (Bandura, 2004). Self-efficacy has been associated with condom intentions and use (Alvarez et al., 2010; Peltzer, 2000; Rijdsdijk et al., 2012; Wagner et al., 2011) and as a determinant in health care provider choice (Nuwaha, 2005) in Uganda and other developing countries. In the context of resource-limited settings, self-efficacy to use contraceptives may be heavily influenced by factors related to one's partner. For example, sexual communication self-efficacy with one's partner has been associated with increased use of contraceptives among female students in Vietnam (Bui et al., 2012) and a lack of self-efficacy to negotiate condom use is a reported barrier to condom use among people living with HIV (PLHIV) in South Africa (Cornman et al., 2011). Furthermore, one's self-efficacy to use contraceptives and access family planning services is likely influenced by their prior use of contraceptives and services. Prior research has identified prior use of contraceptives as a strong predictor of contraceptive use among postpartum women (Eliason et al., 2013). Therefore, a history of contraceptive use can be considered an enabling resource to current use among women. Similarly, past access of services, such as having delivered a child in a healthcare facility, may also be enabling resources for family planning service uptake and contraceptive use.

Relationship factors. The ABM classifies social support and related relationship-level determinants as enabling factors (Andersen, 1995). However, based on growing consensus of

the strong influence of the male partner on women's sexual decision making, reproductive health, and contraceptive use in resource-limited settings (Barker et al., 2010; Jewkes, 2010; WHO, 2007), in the present study I examine relationship factors as a separate domain. Men's control over reproductive health is likely an outcome of upstream factors related to the masculinity and gender role norms prevalent in patriarchal societies. Gender inequity is commonly reported in resource-limited settings (United Nations Development Programme, 2012), including Uganda (Bwambale et al., 2008; Mirembe & Davies, 2001). Furthermore, sexuality, fertility, and large family size are strongly tied to the definition of manhood for many men in sub-Saharan Africa, as is the idea that males should hold more sexual power and control sexual decision making (Barker & Ricardo, 2005). Research indicates that men who subscribe strongly to such beliefs have increased sexual decision making power and are more likely to be perpetrators of violence (Shannon et al., 2012). Similarly, using DHS data from high fertility countries in East Africa, Snow, Winter, and Harlow (2013) found men's greater acceptance of wife beating was consistently associated with higher fertility aspirations across all countries, independent of sociodemographic factors. Women's endorsement of inequitable gender attitudes is also associated with large family ideals (Upadhyay & Karasek, 2010) and low contraceptive use (Nanda, Schuler, & Lenzi, 2013), as are structural indicators of gender inequity, such as educational and economic disparities and age discordance within couples (Bankole & Olaleye, 1995; Ezeh, Mberu, and Emina 2009; Woldemicael, 2007).

In a recent analysis with DHS data across eight African countries, more than half of women were considered to have low household decision-making authority (Singh, Bloom, & Brodish, 2013). Blanc (2001) theorized that power in sexual relationships has an influence on use of health services by impeding women's ability to gain information, make decisions, and act within reproductive health domains, which subsequently influences sexual and reproductive health outcomes. In support of this framework, studies in Asia and Africa have demonstrated a positive association between power in sexual decision making and accessing reproductive and

maternal and child health services (Babalola, 2009; Fotso, Essendi, & Ezeh, 2009; Mistry, Galal, & Lu, 2009; Singh et al., 2012). Furthermore, protective associations have been found between decision making equity and maternal health outcomes (Singh, Bloom, & Brodish, 2013) and condom use (Harvey et al., 2003; Pulerwitz, Gortmaker, & DeJong, 2000; Wingood & DiClemente, 2000). The recent DHS survey from Uganda reports only 23% of Ugandan women report being the sole rather than joint decision maker regarding their own healthcare and that contraceptive use is positively associated with participation in household decisions (UBOS & IFC International Inc., 2012). Moreover, qualitative research with Ugandan youth revealed the prevalent belief that the final decision to use a condom is up to the man, as is the final decision to use contraceptives to prevent pregnancy (Nalwadda et al., 2010).

Research examining women's empowerment, typically measured in terms of a woman's economic and educational independence, decision making power in the household, and non-adherence to beliefs about women's subordinate role (Malhotra & Schuler, 2005; Malhotra, Schuler, & Boender, 2002), further exemplifies the role of relationship power on a woman's ability to access family planning and use contraceptives. For example, using DHS data from Namibia, Zambia, Ghana, and Uganda, Do and Kurimoto (2012) found a strong relationship between the overall score of women's empowerment and contraceptive use: an increase of one point in the empowerment score was associated with a 21% increase in the likelihood of using female-only methods (i.e., the pill, IUD, injectable, implant) as opposed to no method, and a 31% increase in the likelihood of using couple methods (i.e., male and female condom, diaphragm, foam, jelly, withdrawal, lactational amenorrhea method, periodic abstinence) instead of no method.

Unequal power in a relationship can also be manifested in the form of intimate partner violence (IPV), which may influence contraceptive use through multiple pathways related to women's decreased ability to influence the timing and circumstances of sex (Dunkle & Jewkes, 2013). IPV comes in different forms, including physical, emotional, and sexual abuse

(Andersson et al., 2007) and is a significant public health problem globally, with especially high prevalence in sub-Saharan Africa (Borwanka, Diallo, & Sommerfelt, 2008). IPV has been identified as a determinant of negative reproductive health outcomes for women, including inconsistent condom use (Tsai & Subramanian, 2012) and shorter intervals between births (Hung et al., 2012). According to DHS data, 56% of ever-married women in Uganda report having ever experienced physical and/or sexual violence at the hands of a husband or partner (UBOS & IFC International Inc., 2012). In Uganda, IPV was cited as a commonly held outcome expectation for women attempting to use contraceptives, with both men and women agreeing that violence against women should be expected if women are found using, or even suspected of using, contraceptives (Kaye et al., 2006; Nalwadda et al., 2010). Furthermore, Kaye et al., (2006) identified domestic violence as a risk factor for unwanted pregnancy and induced abortion among women at Mulago Hospital in Kampala, Uganda, highlighting the importance of exploring the relationship between IPV and contraceptive use in Uganda.

Within social cognitive theory, the influence of interpersonal relationships on health behavior is encompassed in the outcome expectancies construct, which posits that health behavior is affected by the outcomes one's behavior is expected to produce, which includes social approval or disapproval in one's interpersonal relationships (Bandura, 2004). A husband or partner's actual or perceived opinion has been found to be positively associated with contraception decisions among postpartum and non-postpartum populations in studies across developing countries (Duong, Lee, & Binns, 2005; Eliason et al., 2013; Kulczycki, 2008; Okech, Wawire, & Mburu, 2011; Samandari et al., 2010; van den Brink et al., 2011; Yue, O'Donnell, & Sparks, 2010). Research from Uganda suggests that women's expected reaction from their partner may be an important factor to consider in their decision to use contraceptives (Khan et al., 2008). Wolff, Blanc, & Ssekamatte-Ssebuliba (2000) found that men's opposition to contraception was associated with an increase in women's unmet need, as well as increased reliance on ineffective methods (e.g., withdrawal, rhythm method) instead of effective modern

methods (e.g., condoms, pills, intrauterine device, injectables). Injectable contraceptives is the most commonly used form of contraception among Ugandan women, which may be because they are strongly promoted, but could also be because they are easy to conceal, suggesting that women feel the need to hide contraceptive use from their partner (UBOS & IFC International Inc., 2012).

In addition to perceived or actual partner acceptance of contraception, partner's fertility desires are important to consider in this context. In many sub-Saharan countries and in other developing nations, individuals tend to favor large family sizes (Bankole & Audam, 2011), with cultural status often tied to family size for both men and women (Dhont et al., 2010; Kiene et al., 2013; van Balen & Bos, 2009). Ugandan women cite the need to have many children as a way to keep their husband satisfied and to avoid abandonment and social stigma (Kiene et al., 2013; Wolff, Blanc, & Ssekamatte-Ssebuliba, 2000). High infant and child mortality rates in resource-limited settings also contribute to the desire for a high number of pregnancies, as it is often anticipated that only a portion of pregnancies will lead to children that survive infancy and childhood (Bongaarts, 2011). Not surprisingly, research indicates higher fertility desires among couples is associated with less contraceptive use (Bankole & Audam, 2011; Kulczycki, 2008).

In studies examining differences between women and men in their desire for more children in sub-Saharan Africa, partners tend to have similar ideal family sizes (Bankole & Augam, 2011; Wolff, Blanc, & Ssekamatte-Ssebuliba, 2000). When differences exist, men typically want more children than women, though women often perceive their husbands to want more children than they actually do (Bankole & Augam, 2011). Given the mounting evidence of the strong influence of men's attitudes towards family planning on women's contraceptive use, men's desire for more children may have a similar effect on contraceptive use, as early research suggests (Dodoo, 1998). However, examining fertility preference and contraceptive use across 24 countries in sub-Saharan Africa, Bankole and Audam (2011) found paradoxically that when women wanted more children than their husbands, they were more likely to be using

contraceptives and when they wanted fewer children than their husband, they were less likely to be using contraceptives. Other research suggests the stronger influence of the man's family size preference than the woman's ideal family size on contraceptive use in settings with high gender inequity (Mason & Smith, 2000).

Community-level gender norms may also be manifested at the relationship-level as communication deficits between partners. Qualitative research in Uganda reveals discussion about family planning or sexual matters may be deemed inappropriate between spouses, especially when such conversations are initiated by the woman (Kiene et al., 2013). Blanc & Wolff (2001) found only 24% of Ugandan men and 28% of Ugandan women reported it being acceptable for married women to ask their husband to use a condom. In couples where communication is high, however, women are more likely to have more knowledge of and favorable attitudes towards contraceptives and are more likely to use contraceptives (Agyei & Migadde, 1995). Furthermore, research throughout developing countries indicate communication about family planning with one's partner (Ankomah, Anyanti, & Oladosu, 2011; Link, 2011; Oladeji, 2008; Paek et al., 2007; Sales et al., 2012; Samandari et al., 2010; Yue, O'Donnell, & Sparks, 2010), as well as with friends, family members, and health workers (Ankomah, Anyanti, & Oladosu, 2011; Babalola, Oleko Tambashe, & Vondrasek, 2005; Magadi & Agwanda, 2009) is associated with an increased use of contraception.

Need. The final domain of interest in the ABM is need, which includes both perceived need and evaluated need (Andersen, 1995). Evaluated need represents professional judgment about an individual's health status and their need for medical care (Andersen, 1995). Although family planning has preventative health benefits, it is typically treated as a woman or couple's personal choice, and is similarly recommended to all women presenting to care. Therefore, one's perceived need is likely more relevant to family planning than evaluated need. Andersen (1995) contests that how a person views their own general health, experiences symptoms or illness, and judges the significance of a health problem is an important determinant to seeking

health services and adopting new health behaviors. Perceived need is described as a mainly social phenomenon largely explained by socioeconomic status and health beliefs (Andersen, 1995). Therefore, in addition to the predisposing and enabling factors previously discussed, perceived need for family planning services may result from one's desire to prevent pregnancy and perceived susceptibility to pregnancy (Hall et al., 2012). There may be low perceived susceptibility to pregnancy in postpartum women during the postpartum and/or lactational amenorrhea interval which provides temporary protection from pregnancy before the return of menstruation (Duong, Lee, & Binn, 2005; Salway & Nurani, 1998). Low perceived need for attending antenatal care (Waiswa et al., 2008) and postpartum care (Nabukera et al., 2006), both of which includes family planning counseling, have been documented in rural populations in Uganda.

The Present Study

Applying Andersen's Behavioral Model of Health Services Use (Andersen, 1995; Andersen & Newman, 1973) to conceptualize the family planning literature has highlighted areas in need of further exploration in understanding predictors of contraceptive use. Given Uganda's significant unmet need for family planning services and the individual and population-level consequences of this unmet need, more research is needed on predictors of family planning service uptake and contraceptive use. Furthermore, there is a gap in the literature on determinants of contraceptive use and family planning service uptake among postpartum women. Given the short time intervals between births among Ugandan women (Rutstein, 2011), there may only be a brief window of time to link many postpartum women to family planning services before their next pregnancy. Therefore, it may be especially important to understand predictors of uptake of family planning services and contraceptive use among postpartum women. It is possible that different factors influence family planning service uptake and contraceptive use during this time period and little research exploring contraceptive use and family planning intentions with Ugandan women has specifically targeted women post-delivery.

Therefore, the purpose of this study is to use the framework of the ABM to explore determinants of uptake of family planning services and contraceptive use among postpartum women in rural Uganda.

Based on the literature reviewed in Uganda and other developing countries, I hypothesize that the following factors will have a positive effect on uptake of family planning services and contraceptive use: predisposing factors: number of children, age, education, knowledge about contraceptives, and positive attitudes towards family planning; enabling factors: income, self-efficacy towards family planning, prior use of contraceptives, having delivered in a healthcare facility; relationship factors: sexual relationship power (relationship power and decision making dominance), perceived partner's positive attitudes towards family planning, communication with partner about contraceptives, and perceived need of family planning. Additionally, I hypothesize that the following factors will have a negative effect on uptake of family planning services and contraceptive use: health system factors: distance from the clinic; predisposing factors: postpartum depression symptoms; relationship factors: history of intimate partner violence (emotional and physical), and perceived differences in one's own and one's partner's fertility desires. Finally, there may be differences in family planning service uptake and contraceptive use by the predisposing factor religion, specifically there may be lower use among Catholic and Muslim women compared to other religious groups. See Figure 2 for a depiction of the independent and outcome variables of interest mapped onto the ABM domains.

Methods

The present study is a cross-sectional analysis of a larger study conducted by Professor Susan Kiene, which assessed the influence of male partner involvement in antenatal care (ANC) on family planning outcomes. The research was conducted in Butambala District, Uganda at the rural 100 bed Gombe hospital serving a population of approximately 300,000 people with active ANC and postnatal care clinics. Pregnant women receiving antenatal services typically first report to ANC at their fourth month, returning approximately monthly until

their eighth month, and subsequently every one or two weeks until their delivery. Health education delivered by nurses and midwife nurses is one component of the ANC program, which includes a range of health topics, including family planning. Family planning is generally discussed at the eighth month visit. Six weeks postpartum, women return for postnatal care and again at ten and fourteen weeks for infant immunizations.

Participants were recruited from the ANC clinic at Gombe Hospital. Women attending ANC for their 7-month visit were informed by hospital staff about the research study and referred to a research assistant to learn more about the study. Of those offered participation, 301 enrolled in the study and 49 declined to participate. The research assistant obtained written informed consent. Women were excluded from the study if they did not meet the following criteria: 1) at least 18 years of age, 2) if the father of the current pregnancy was not living with them or nearby or if they did not have a partner (necessary for research questions related to couples counseling in the original study), 3) if they lived further than 20 km from the hospital (for retention purposes), 4) if they were not willing to return for a follow-up interview 10-weeks post-delivery, and 5) if they were not well enough to participate as judged by hospital staff.

Participants were interviewed by a research assistant one-on-one in a private setting at study enrollment and again approximately 10 weeks postpartum. With the exception of demographic items collected at baseline, only follow-up data is included in the current analysis (participants not completing follow up were excluded, n=43), since the baseline data did not include many of the factors of interest for the present analysis. Women returned an average of 13 weeks post-delivery and completed the follow-up questionnaire. The average return follow up was longer than the planned 10 week follow up time because of differences in estimated due dates and actual due dates and based upon when mothers brought their infants to the hospital for immunizations. A research assistant conducted the baseline and follow-up questionnaires in a one-on-one interview using CAPI (Computer Assisted Personal Interview software) (NOVA Research Company, 1998). The study was approved by the Rhode Island Hospital Institutional

Review Board (IRB) (Dr. Kiene's former institution), Makerere University School of Public Health IRB in Uganda, and the Ugandan National Council for Science and Technology. All participants provided written informed consent.

Measures

The measures relevant to the current study included potential key factors associated with uptake of family planning services and use of contraceptives. Measures that mapped onto the ABM as well as other potential predictors were included in the present analysis, however, the original study did not include all factors relevant to the ABM, as that was not the purpose of the study. Questions were translated into Luganda (the primary language of the population), back-translated, piloted, and modified for cultural equivalence. Many of the measures have been used in prior studies at Gombe Hospital.

Health System Factors.

Time to the clinic. An item was constructed to measure participants' travel time to the clinic: "How long does it normally take you to travel from your home to this clinic?" After data collection, all responses were converted into minutes and categorized into four groups: (0) 0-30 minutes, (1) 31-60 minutes, (2) 61-120 minutes, or (3) more than 120 minutes.

Predisposing factors.

Demographics. Demographics questions were constructed for the original study. They assessed the following: age, education level, number of children, and religion.

Postpartum depression. Postpartum depression was assessed by use of a modified 15-item version of the Center for Epidemiologic Studies Depression (CESD) scale (Radloff, 1977). Radloff (1977) reported strong evidence for validity of the measures and Cronbach's alpha coefficients of 0.84-0.85 in community samples and 0.90 in clinical samples, indicating good internal consistency. Relevant to the present study, good internal consistency ($\alpha = 0.82$) and moderate test-retest reliability ($r=0.61-0.62$) has been reported in samples of postpartum women (Beeghly et al., 2002, 2003; Boyd, Le, & Somberg, 2005), and in research in Uganda (α

= 0.85) (Kaharuza, 2006). Participants were asked 14 of the 15-item modified CESD questions; for reasons related to cultural stigma, the scale was modified to exclude a question assessing suicidal thoughts. Items asked participants to report the frequency (ranging from (0) not at all to (3) extremely) in which they experienced a set of depressive symptoms (e.g., feeling sad, low in energy, crying easily) during the past week ($\alpha = 0.85$ in the present sample). The sum of all items was calculated, with possible values ranging from 0 to 42. The cutoff for 'possible depression' was set at 11 and for 'probable depression' at 16, which is proportionate to the standard cutoffs used for the CESD-20 (16 and 23, respectively) (Radloff, 1977). Since participants recently gave birth, reported depressive symptoms were considered postpartum depression.

Contraceptive knowledge. Knowledge questions were adapted from the Demographic and Health Surveys (DHS) measures (Measure DHS, 2013). Nine questions assessed respondent's accurate knowledge of the effectiveness of different family planning methods (e.g., pills, injectables, rhythm method, etc.). Question responses were scored as either correct (1) or incorrect (0). A total knowledge score was obtained based on calculating the total percent of correct responses.

Attitudes towards family planning. The item assessing attitudes towards family planning was modified from Information-Motivation-Behavioral Skills (IMB) measures (Misovich et al., 1998) for sexual risk behavior ($\alpha = 0.87$), which have been used in prior studies at Gombe Hospital. These items are also very similar to Theory of Planned Behavior Measures for assessing attitudes towards a particular behavior (Ajzen, 2006). The mean of the following two items measured attitudes towards family planning: "How would you feel about using family planning" and "How would you feel about receiving couples counseling about family planning with him [current partner]" (response options ranging from (1) very bad to (5) very good) and how they felt about. Responses were recoded for data analysis to a 0-4 scale.

Enabling factors.

Monthly income. Income was assessed at baseline through an item constructed for the study: “How much do you usually earn per month?” Respondents gave a value in Ugandan Shillings. For data analysis, scores were coded into the following three categories: (0) 0-30,000 Shillings (~0-15 USD), (1) 30,000-100,000 Shillings (~15-50 USD), and (2) more than 100,000 Shillings (~50 USD).

Self-efficacy towards family planning. The items assessing self-efficacy were modified from existing Information-Motivation-Behavioral skills (IMB) measures ($\alpha = 0.80$, Misovich et al., 1998). The mean of two items was used to assess women’s self-efficacy towards family planning. The items assessed how easy or hard the respondent would find using family planning methods with their partner’s knowledge and how easy or hard the respondent would find receiving couples counseling with their partner (response options ranging from (1) very hard to (5) very easy). Responses were recoded for data analysis to a 0-4 scale.

Prior use of contraceptives. Prior use of contraceptives was operationalized by one question constructed for the study. The respondent was asked to select any contraceptive method from an exhaustive list of methods that they have ever used. Women responding yes to one method or more were considered having a history of contraceptive use (1) and respondents selecting no method were considered having had no prior history of contraceptive use (0).

Location of delivery. One item constructed for the study assessed where participants delivered during their most recent pregnancy. Participants were asked where they delivered, with response options including: Gombe Hospital, another hospital, another health care facility, or at home. For data analysis, responses were recoded into (0) at home and all other responses were considered (1) any health care facility.

Relationship factors.

Sexual relationship power. Sexual relationship power was assessed using Pulerwitz and colleagues’ (2000) Sexual Relationship Power Scale, which included both the Relationship

Control and Decision-making Dominance sub-scales and holds predictive and construct validity, and good internal reliability ($\alpha = 0.84$). The subscales were analyzed separately, with relationship control and decision making dominance considered separate independent variables. The relationship control sub-scale included 11 questions on a 5 point scale, such as “If I asked my partner to use a condom, he would get violent” (response options ranging from (1) strongly disagree to (5) strongly agree) ($\alpha = 0.82$ in the present sample). Responses were reverse scored and recoded to a 0-4 scale. The mean of all items were calculated, with higher scores indicating higher relationship power for women. The decision making dominance sub-scale included five 3-point scale questions, such as “Who usually has more say about whether you use condoms?” (response options including your partner, you, both of you equally) ($\alpha = 0.67$ in the present sample). The mean of all items were calculated, with higher scores indicating more decision making dominance for women.

Perceived partner’s attitudes towards family planning. Two items from Rosengard et al. (2004) were adapted to measure perceived partner’s attitudes towards family planning. Participants were asked how their partner would feel about them using family planning methods and how their partner would feel about receiving couples counseling about family planning with them (response options ranging from (1) very bad to (5) very good). Responses were recoded from a 0 to 4 scale and the mean of the two items was calculated, with higher scores indicating perceiving more positive partner attitudes.

History of emotional and physical abuse. History of intimate partner violence (IPV) was measured through the Measures of Abuse scale from the Demographic Health Survey (DHS) measures (Measure DHS, 2012), which originated from the Conflict Tactics Scale (Straus, 1990). This scale has been found valid ($\alpha = 0.82$) and reliable for measuring domestic violence in developing nations (Straus & Mickey, 2012). A history of IPV was categorized into two forms of violence: emotional and physical abuse. Having a history of any emotional violence was measured by four questions asking participants if their current spouse or partner had ever

perpetrated emotional abuse (e.g., Has he ever insulted you or made you feel bad about yourself?; Has he ever belittled or humiliated you in front of other people?). Response options included yes or no ($\alpha = 0.62$ in the present sample). If women responded yes to any emotional abuse questions, they were coded as having a history of emotional abuse (1) and were coded as having no history of emotional abuse (0) if they responded no to all questions. Eight questions assessed whether women had ever experienced any physical abuse from their current spouse or partner (e.g., Did your current spouse/partner ever... slap you?; push you, shake you, or throw something at you?; force you to perform any sexual acts you did not want to?). Response options included yes or no ($\alpha = 0.68$ in the present sample). If women responded yes to any physical abuse questions, they were coded as having a history of physical abuse (1) and if they responded no to all items, they were coded as having no history of physical abuse (0).

Communicating with partner about contraceptives. An item constructed to assess communication with partner about contraceptives was constructed: “Since you delivered, how often have you discussed family planning with him [current partner]?” (response options ranged from (0) never to (3) regularly).

Perceived male/female difference in fertility desires. Perceived difference in fertility desires between partners assessed the number of additional children women believed their partner desired them to have compared to the number of additional children women themselves wanted to have with their partner. This item was constructed by computing the difference between two items: “How many (more) children does he want you to have by him?” and “How many (more) children do you want to have by him?” A zero indicates women perceive no difference in the number of additional children they and their partner want. A negative number indicates women perceive wanting more additional children than their partner does. A positive number indicates women perceive their partner wanting more additional children than they want.

Need.

Perceived need of contraceptives. Adapted from Rosengard et al. (2004), perceived need of family planning was assessed by the following question: “In the future do you plan to use family planning?” with response options ranging from (0) “Not at all Likely” to (4) “Extremely Likely.”

Outcome variables.

Uptake of family planning services. The outcome variable, uptake of family planning services since delivery was operationalized by the combination of two items. Participants were asked “Since you delivered, did you seek family planning services?” and “Since you delivered have you received couples counseling about family planning with him [current partner]?” Response options included yes or no. Participants responding yes to either question were coded as having sought family planning services since delivery (1) and participants responding no to both items were coded as not having sought family planning services since delivery (0). Uptake of family planning services was included as an outcome variable in addition to contraceptive use because women in this sample may not have yet had a need for contraceptive use due to natural contraceptive properties of having recently given birth until menses returns and of breastfeeding, and possible delayed return to sexual activity after childbirth. While uptake of family planning services could include obtaining contraceptives and is a likely indicator of future use of contraceptives for women, seeking services may not necessarily reflect use of contraceptives.

Any effective contraceptive use. The second outcome variable measured use of any effective contraceptive method since delivery. Effective contraceptive use was assessed by the question: “Since you delivered did you use any of the following family planning methods?” Response options included a list of family planning methods to choose from. Methods considered effective included: condoms (currently using during at least 90% of sex acts), pills, injectables, tubal ligation, vasectomy, intrauterine device, and implants. Methods considered

ineffective included: the rhythm method and withdrawal. A positive response to any effective method was coded as “yes” (1) to using effective contraceptives since delivery. Women responding no to all items, or yes to only ineffective methods were coded as “no” (0) to using effective methods since delivery.

Data Analysis Approach

Bivariate logistic-regression models using SPSS version 20 (IBM Corp, 2011) were used to test the following as independent predictors of the outcomes of uptake of family planning services and use of any effective contraceptives: time to clinic, number of children, age, education, religion, postpartum depression, contraceptive knowledge, attitudes towards family planning, income, self-efficacy towards family planning, prior use of contraceptives, location of delivery, relationship control, dominance in sexual decision making, perceived partner attitudes towards family planning, history of emotional intimate partner violence, history of physical intimate partner violence, communication with partner about contraceptives, perceived difference in fertility desires with partner, and perceived need of family planning. Separate models were run for each of the two outcomes.

Factors found to be significantly associated ($p < 0.10$) with either of the outcome variables in the bivariate analysis were included in a hierarchical multivariate regression analysis for family planning service uptake and a hierarchical multivariate regression analysis for contraceptive use. Variables were entered into the multivariate regression models in blocks mapped onto Andersen’s Behavioral Model of Health Services Use: 1) health system factors, 2) predisposing factors, 3) enabling factors, 4) relationship factors, and 5) need (Andersen, 1995). Hierarchical regression is a suitable method for testing theoretically-grounded predictor variables, as it allows for blockwise entry of variables based on a priori assumptions of the order of the variables in the model. Entering variables in blocks that map onto Andersen’s Behavioral Model of Health Services Use allows us to see the influence of variables while still taking into account theoretically presumed distal predictors of the outcome, allowing for interpretation of the

results in relation to the theoretical framework. Adjusted Odds Ratios (AOR) with 95% confidence intervals (CI) are presented and used to interpret the effect size of each predictor variable on the outcome variables. Since the pseudo R^2 statistics (Cox & Snell R^2 and Nagelkerke R^2) provided in logistic regression analysis cannot be interpreted as the variance accounted in the outcome by the model as R^2 is interpreted in linear regression, I do not report R^2 statistics (Hosmer & Lemeshow, 2000). The model chi-square and corresponding p value is presented for each block, indicating the effect and significance of the variables taken together in predicting the outcome variables. Block chi-squares and p values are also presented, which indicate the chi-square difference and significance between blocks. I assessed the ability of the model variables to accurately predict the outcome by calculating the receiver operating characteristic (ROC) curve for each block of the multivariate analysis for each outcome and compared the improvement in classification of the predictor variables on the dichotomous outcome variables between each block. ROC statistics and graphs are presented.

Results

Participant characteristics and descriptive statistics

A total of 258 women completed follow-up measures and were included in the analysis. The majority (98.8%) of women were married and living with their partner most of the time (an eligibility requirement for participation), 25% of which were in a polygamous marriage. Most women were from the Buganda tribe (75%) or the Munyarwanda tribe (14%), and identified as Muslim (41.9%), Catholic (33.2%), or Other (24.9%) (Protestant = 18%, Saved/Pentecostal = 6%, Seventh Day Adventist = 1%). The majority of the women reported time of travel to the clinic (health system factor) being within one hour (<30 min = 31.8%, 31-60 min = 36%), whereas approximately 21% of women reporting living 61-120 minutes from the clinic and 11% reporting living further than 120 minutes from the clinic (see Table 1 for a summary of this and additional descriptive statistics reported below).

Descriptive statistics of the predisposing factors include the following: the average age of the participants was 25.85 (range = 18-44; SD = 6.13). The entire sample had received some schooling, with approximately 58% having attended primary only, 33% attended some secondary or completed secondary, and 10% with a level of education greater than secondary. The average number of living children the women reported at baseline not including their current pregnancy was 2.37 (SD = 2.29), ranging from 0 (27.9%) to 10 (0.8%). On average, women answered 40% of questions about effective contraceptive use correctly (SD = 20%). The mean score on the family planning attitudes scale was 3.63 (SD = 0.66) (scale range 0-4). The mean depression score for women was below the cut-off score of 11 indicating possible postpartum depression (M = 6.61, SD = 6.24). Specifically, approximately 78% were not classified as having postpartum depression, and 11% and 11% met criterion for possible depression (score of 11-16) and probable depression (score of 16 or greater), respectively.

Of the enabling factors, most women, nearly 80%, reported an income of 30,000 Shillings or less a month (~15 USD at the time of the study). The mean score on the scale assessing self-efficacy towards family planning was 3.10 (SD = 1.03) (scale range 0-4). The majority of women reported some prior use of contraceptives (83.3%). Most women delivered their current pregnancy in a health care facility (88.4%) compared to at home (11.6%).

The mean score on the relationship control scale was 2.28 (SD = 0.79) (scale range 0-4) and 0.65 (SD = 0.44) (scale range 0-2) on the decision making dominance scale, indicating moderate sexual relationship power among women. Other descriptive statistics for relationship factors include those on the prevalence of IPV: 63.5% and 45.8% of women reported ever experiencing any emotional abuse or physical abuse respectively from their current husband/partner. The mean score for women's perceived partner's attitudes towards family planning was 2.40 (SD = 1.03) (scale range 0-4). On the communication with partner about contraceptives measure (range 0-4), the mean score reported was 1.81 (SD = 1.22).

The perceived need of family planning (need factor) among women was high ($M = 3.71$, $SD = 0.81$), with most women reporting intending to use family planning in the future. However, actual use of contraceptives was lower, with only 25% of women reporting using any effective contraceptives since delivery. Similarly, uptake of family planning services was low; 31% of women reported seeking family planning services (e.g., counseling about family planning, obtaining contraceptives) since delivery.

Bivariate Analysis

Uptake of family planning services. Table 2 displays the findings from bivariate logistic regression analyses testing the associations between independent variables and the outcome of uptake of family planning services since delivery. No statistically significant association was found between time to clinic, the only variable categorized as a health system factor, and uptake of family planning services. Among predisposing factors, education was the only statistically significant predictor of uptake of family planning services. Education was positively associated with uptake of family planning services for those with a secondary-level of education compared to those with a primary-level of education or less ($OR = 2.31$, $95\% CI = 1.31-4.08$), but secondary or higher was not statistically significantly different from primary or less in its association with uptake of family planning services. All other predisposing factors (number of children, age, religion, depression, contraceptive knowledge, and attitudes towards family planning) were not significantly associated with the dependent variable at $p < 0.10$. Of the enabling factors, income, self-efficacy towards family planning, and location of delivery were not associated with uptake of family planning. However, a statistically significant positive association was found between prior use of contraceptives and uptake of family planning services; women reporting prior use of contraceptives were over 11 times more likely to report uptake of family planning services compared to those not reporting prior use of contraceptives ($OR = 11.67$, $95\% CI = 2.75-49.57$). Of the relationship factors, two variables were found to be independently associated with uptake of family planning: perceived partner attitudes towards

family planning and communicating with partner about contraceptives. For every one unit increase in the measure assessing perceived partner attitudes towards family planning, women were 37% more likely to report seeking family planning services (OR = 1.37 CI = 1.04-1.81). That is, women who perceive their partner to have positive attitudes about family planning are more likely to seek family planning services. Similarly, the more frequently women discuss family planning with their partner, the more likely they are to seek services; for every one unit increase in the measure assessing communication with partner about contraceptives, the likelihood of uptake in family planning services was 1.79 times greater (OR = 1.79, 95% CI = 1.38-2.31). All other relationship factors, sexual relationship power, emotional and physical abuse, and difference in fertility desires, were not associated with uptake in family planning services at $p < 0.10$. Finally, perceived need was a statistically significant predictor of uptake of family planning. Each one unit increase in perceived need of family planning was associated with a 3.21 times greater likelihood of uptake of family planning services (OR = 3.21, 95% CI = 1.29-7.96).

Use of any effective contraceptives. Results from bivariate logistic regression analysis testing the association between independent variables and the outcome of use of any effective contraceptives since delivery are presented in Table 2. No statistically significant association was found between time to clinic (health system factor) and uptake of family planning. Those with a secondary-level education were nearly twice as likely to use contraceptives as those with a primary-level education or less (OR = 1.71, 95% CI = 0.94-3.11), though this association was only borderline significant ($p = 0.08$) but this same trend was not observed for those with a secondary-level education or higher. Other than education, no other predisposing factors were statistically significantly related to use of contraceptives at $p < 0.10$. Among enabling factors, prior use of contraceptives was a strong predictor of use of contraceptives postpartum; women reporting a history of contraceptive use were nearly 18 times more likely to report having used effective contraceptives since delivery (OR = 17.80, 95% CI = 2.40-132.14). No statistically

significant relationships were found between either of the other enabling factors (self-efficacy towards family planning and location of delivery) with use of contraceptives. Among relationship factors, sexual relationship power, perceived partner attitudes towards family planning, emotional and physical abuse, and perceived difference in fertility desires were not found to be statistically significant predictors of use of contraceptives. The association between communication with partner about contraceptives was the only relationship factor found to be a statistically significant predictor of use of contraceptives postpartum. Communication with partner about family planning was positively associated with use of contraceptives, with a 1.86 increased likelihood of using contraceptives for every one unit increase in the measure assessing communication with partner about contraceptives (OR = 1.86, 95% CI = 1.39-2.48). Finally, perceived need was also positively associated with use of contraceptives; every one unit increase in perceived need for family planning was associated with a 2.59 times greater likelihood of contraceptive use (OR = 2.59, 95% CI = 1.10-6.09).

Multivariate analysis: Hierarchical logistic regression

Constructs found to be associated with either outcome at $p < 0.10$ in the bivariate analyses were included in the multivariate model for each outcome. Hierarchical multivariate logistic regression was used to test predictors of the two outcomes: uptake of family planning services since delivery and use of any effective contraceptives since delivery. For both models, independent variables were entered into the model in four blocks which correspond with Andersen's Behavioral Model of Health Service Use: 1) predisposing factors, 2) enabling factors, 3) relationship factors, and 4) need, with each block adding to the variables entered in earlier blocks. Health system factors, which would have been the first block entered, was dropped from multivariate analyses because, as reported above, a statistically significant bivariate association was not found between the assessed health system factor (i.e., time to clinic) and either outcome variable. First, statistically significant predisposing factors were entered (education). Next, enabling factors were entered (prior use of contraceptives). The third

block entered included relationship factors (perceived partner attitudes family planning and communication with partner about contraceptives). The final block included need factors (perceived need of family planning). In the final model for both outcomes, perceived partner attitudes towards family planning became inversely (negatively) related to both outcome variables compared to the positive independent associations found in bivariate analysis. As this may be an indicator of multicollinearity between perceived partner attitudes and partner communication, perceived partner attitudes was removed from the multivariate analysis for both outcomes. The result reported below are from analyses excluding perceived partner attitudes towards family planning.

Uptake of family planning services. Results of the multivariate model testing predictors of uptake of family planning services are displayed in Table 3. Block 1 which was predisposing factors, was significantly related to uptake of family planning services overall ($\chi^2 = 9.08, p = 0.01$). Block 1 included only one predisposing predictor, level of education, which was statistically significantly related to family planning service uptake (OR = 2.31, 95% CI = 1.31-4.08) as reported in the bivariate analysis in Table 2.

Block 2 added the enabling factor prior use of contraceptives to the model. A statistically significant chi-square difference, or improvement in the prediction of uptake of services, was found in block 2 compared to block 1 (χ^2 diff = 21.22, $p < 0.01$). The overall model was also statistically significant ($\chi^2 = 30.30, p < 0.01$). With prior use of contraceptives added to the model, secondary education remained statistically significant: women with a secondary education were about 2 times more likely to seek family planning services than those with a primary-level education or less (AOR = 2.26, 95% CI = 1.25-4.07). Having more than a secondary-level education, however, was not statistically significantly different than primary-level in its effect on family planning service uptake (AOR = 0.80, 95% CI = 0.29-2.20). Prior use of contraceptives was also significantly related to uptake of family planning services. Women

with a history of contraceptive use were nearly 12 times more likely to seek family planning services than women without a history of use (AOR = 11.82, 95% CI = 2.76-50.59).

With the addition of relationship factors, block 3 was overall statistically significant in relation to uptake of family planning services ($\chi^2 = 49.42$, $p < 0.01$), and the chi-square difference between block 3 and block 2 was statistically significant (χ^2 diff = 19.62, $p < 0.01$). Those with a secondary-level education (AOR = 2.81, 95% CI = 1.49-5.30), but not those with more than a secondary education (AOR = 0.67, 95% CI = 0.24-1.87), remained more likely to seek family planning services compared to those with only primary-level of education or less. A positive association between prior use of contraceptives and uptake of family planning also remained statistically significant in block 3, though the effect slightly decreased with the addition of relationship factors to the model (AOR = 9.13, 95% CI = 2.06-40.42). With predisposing and enabling factors controlled for, communication with partner about contraceptives was a positive predictor of contraceptive use. Every one unit increase on the family planning communication measure was associated with a 1.79 greater likelihood of uptake of family planning services (AOR = 1.79, 95% CI = 1.36-2.37).

With the addition of the need variable to the model in block 4, the overall model with all variables entered was statistically significantly associated with uptake of family planning services ($\chi^2 = 59.44$, $p < 0.01$) and block 4 improved the prediction of the outcome variable compared to block 3 (χ^2 diff = 9.53, $p < 0.01$). With the addition of perceived need, education remained statistically significant at the secondary level, with a stronger effect on the outcome variable in the final model (AOR = 3.03, 95% CI = 1.57-5.83). The effect of the enabling factor, prior use of contraceptives, decreased with all other model variables accounted for, but a statistically significant association remained (AOR = 7.15, 95% CI = 1.58-32.37). Communication with partner about contraceptives remained a statistically significant predictor of uptake of family planning use, with a similar effect size as in block 3 (AOR = 1.80, 95% CI =

1.36-2.37). Finally, with all other variables accounted for, a statistically significant positive relationship was found between the need variable and uptake of family planning services. Specifically, every one unit increase in the measure of perceived need of family planning was associated with a 2.57 greater likelihood of seeking family planning services (AOR = 2.57, 95% CI = 1.09-6.08).

The overall fit of the model to the data was assessed with the receiver operating characteristic (ROC) curve for each added block. The accuracy of the model is measured by the area under the ROC curve. An area under the curve of 0.5 indicates no discriminative value and is represented by a straight, diagonal line known as the line of no discrimination. If the area under the curve is statistically significant, this indicates it is significantly different from the line of no discrimination (ROC 0.5) and therefore has discriminative value, classifying the data better than by chance (Fan, Upadhye, & Worster, 2006). The area under the curve increased with each addition to the model: block 1 enabling factors: ROC 0.60 (95% CI = 0.52-0.67, $p = 0.01$); adding block 2 predisposing factors: ROC 0.68 (95% CI = 0.61-0.75, $p < 0.001$); adding block 3 relationship factors: ROC 0.76 (95% CI = 0.70-0.82, $p < 0.001$); adding block 4 need factors: ROC 0.79 (95% CI = 0.73-0.84, $p < 0.001$). The ROC curves for each block are presented in Figures 3-6. These findings indicate an improvement in fit of the model to the data with each added block. The area under the curve (79%) with all predictors added in the final model indicates that the full model is performing well, with no large discrepancy between observed and expected rates of family planning service uptake.

Use of any effective contraceptives. The final model tested predictors of use of any effective contraceptives since delivery using hierarchical multivariate logistic regression; results are shown in Table 3. The first block, which contained the predisposing variable education, was not statistically significantly related to use of contraceptives overall ($\chi^2 = 4.47$, $p = 0.11$), though there was a trend towards a positive relationship between secondary-level of education and

contraceptive use compared to primary-level of education (OR = 1.71, 95% CI = 0.94-3.11); this relationship was only borderline statistically significant ($p = 0.08$).

In block 2, the enabling factor, prior use of contraceptives was added to the model, and together with block 1 was statistically significantly related to the outcome ($\chi^2 = 24.46$, $p < 0.01$). The difference in chi-squares between block 1 and 2 was also significant (χ^2 diff = 19.98, $p < 0.01$). The addition of prior use of contraceptives to the model did not change the effect of education or prior use of contraceptives; the association remained not statistically significant for all levels of education. Controlling for education, prior use of contraceptives was strongly associated with contraceptive use; women were approximately 18 times more likely to report using effective contraceptives post-delivery if they had previously used contraceptives than those who had not (AOR = 18.11, 95% CI = 2.43-134.83).

A statistically significant association was found between the model and contraceptive use with the addition of block 3 (relationship factors) ($\chi^2 = 42.30$, $p < 0.01$) and block 3 improved the prediction of the outcome variable compared to block 2 (χ^2 diff = 17.86, $p < 0.01$). Education, not statistically significant in blocks 1 and 2, emerged as a statistically significant predictor of contraceptive use with the addition of relationship factors to the model. Women with a secondary-level of education were nearly twice as likely as women with a primary level of education to use contraceptives (AOR = 1.95, 95% CI = 1.02-3.74). No effect was found for those with greater than a secondary education (AOR = 0.46, 95% CI = 0.14-1.49). Prior use of contraceptives remained a strong predictor of postpartum contraceptive use with predisposing and relationship factors accounted for (AOR = 13.25, 95% CI = 1.74-100.72). Communication with partner about family planning was a positive predictor of contraceptive use. Specifically, every one unit increase in the measure assessing communication with partner about contraceptives was associated with a 1.82 greater likelihood of use of effective contraceptives since delivery (AOR = 1.82, 95% CI = 1.34-2.45).

Adding perceived need of family planning (block 4) to all other variables in the model, the overall model was a statistically significant predictor of contraceptive use ($\chi^2 = 47.59, p < 0.01$), and the chi-square difference between block 3 and block 4 was statistically significant ($\chi^2 \text{ diff} = 5.29, p < 0.02$). In the final model, the effect of education on contraceptive remained statistically significant at the secondary education level (AOR = 2.04, 95% CI = 1.05-3.95). The effect of prior use of contraceptives decreased with all variables in the model, but remained strongly related to contraceptive use (AOR = 10.79, 95% CI = 1.40-83.06). The positive association between communication with partner and contraceptive use remained statistically significant with perceived need and other previously entered variables included (AOR = 1.81, 95% CI = 1.34-2.44). Finally, with all other variables controlled for, perceived need of family planning was trending towards a positive relationship with use of effective contraceptives since delivery (AOR = 2.06, 95% CI = 0.91-4.65). However, this effect was only borderline statistically significant ($p = 0.08$).

The receiver operating characteristic (ROC) curve for the model with the addition of each block are presented in Figures 7-10. The area under the curve increased with each addition to the model: block 1 enabling factors: 0.58 (95% CI = 0.50-0.66, $p = 0.06$); adding block 2 predisposing factors: 0.66 (95% CI = 0.59-0.73, $p < 0.001$); adding block 3 relationship factors: 0.74 (95% CI = 0.68-0.81, $p < 0.001$); adding block 4 need factors: 0.76 (95% CI = 0.70-0.83, $p < 0.001$). These findings indicate an improvement in fit of the model to the data with each added block. The area under the curve with all predictors added in the final model was 76%, indicating that the full model is a good fit to the data with predictive accuracy in the outcome variable contraceptive use.

Discussion

The present thesis contributes to our understanding of Uganda's high unmet need for family planning by identifying determinants of family planning service uptake and contraceptive

use among women in rural Uganda and adds to the limited literature examining such determinants in Ugandan women postpartum. Using an adapted version of Andersen's Behavioral Health Service Use model to guide analysis (Andersen, 1995; Andersen & Newman, 1973), statistically significant predictors of family planning service uptake and contraceptive use were identified at multiple levels of the model, including predisposing, enabling, relationship, and need factors. Specifically, the data showed that education, prior use of contraceptives, communication with partner about contraceptives, and perceived need were key determinants of the outcome variables. Taken together, the final model was a good fit to the data and predictive of both uptake of family planning and contraceptive use.

Despite a high perceived need for contraception and generally positive attitudes towards family planning among postpartum Ugandan women, the proportion of women who had sought family planning services (31%) and used effective contraceptives (25%) approximately 3 months postpartum was low. This finding is consistent with evidence of the large disparity between demand for and use of contraceptives throughout Uganda (UBOS & IFC International Inc., 2012). The unmet need for family planning in this sample was 66% (n=171). That is, 66% of women wanting to delay their next pregnancy for at least two years or stop childbearing all together were not using contraceptives, which is considerably higher than the 2011 DHS estimates of the unmet need for family planning among married rural women in Uganda (37%) (UBOS & IFC International Inc., 2012). Though the unmet need in the study sample is likely higher because women had recently given birth and may not have accessed family planning by the time of the survey.

While the present thesis identified factors at the individual and relationship-level to be statistically significant predictors of family planning service uptake and contraceptive use, the health system factor, travel time to the clinic, was not a significant negative predictor of the outcomes of interest as hypothesized. In the present study, distance to clinic was trending in the opposite direction than hypothesized in bivariate analysis with both outcomes, with women

further from the clinic being more likely to use contraceptives, though this was not statistically significant. Proximity to health services has been documented as a structural barrier to various forms of health services in Uganda and sub-Saharan Africa (Ketende, Gupta, & Bessinger, 2003; Okech, Wawire, & Mburu, 2011; Parkhurst, Rahman, & Ssengooba, 2006). My null finding may indicate that the time to clinic item was not a good measure of women's access to family planning services or contraceptives in this population. Women were asked how long it normally takes to travel from home to this clinic. The 2011 Uganda DHS indicates that many women obtain contraceptives from public hospitals, such as the study site, but they also access contraceptives through a range of other sources, including publically funded health centers or the private medical sector (UBOS & IFC International Inc., 2012). It is possible that women living furthest from the clinic in this sample may actually obtain contraceptives from a different location than the research site (Gombe Hospital), masking any true effect between proximity to family planning services and use of those services or actual contraceptive use.

Of the predisposing factors examined in the ABM, I hypothesized that number of children, age, education, knowledge about contraceptives, and positive attitudes towards family planning would all be positively associated with uptake of family planning services and contraceptive use postpartum. Of these predisposing factors, education was the only statistically significant predictor of family planning service uptake and contraceptive use (borderline significant) and it remained statistically significant in multivariate analysis for both outcomes. This finding is consistent with Uganda's DHS findings (UBOS & IFC International Inc., 2012), as well as with data across 24 sub-Saharan African countries indicating women who are more educated are more likely to use contraceptives (UNFPA, 2010). However, women of the highest level of education (greater than secondary) were not more likely to use contraceptives than those with the lowest level education. This finding may be due to a lack of statistical power, with only 9.6% of the sample reporting having more than secondary-level education. The positive association between women's education and contraceptive use can be explained in several

ways, including the positive influence of education on women's empowerment (Snow, Winter, & Harlow, 2013). Although, not supporting my hypotheses, relationship power and decision making dominance were not predictive of family planning service uptake or contraceptive use in the present study, empowerment through education may work through mechanisms not measured in the Sexual Relationship Power Scale (Pulerwitz et al., 2000) used in the present study. For example, educational attainment may increase contraceptive use by altering women's ideas about their own opportunities, increasing their status, and enhancing their bargaining power (Cleland & Wilson, 1987; Potts & Marks, 2001).

The positive association between women's education and contraceptive use may also be explained through the positive influence of education on women's contraceptive knowledge and attitudes (Agyei & Migadde, 1995). Women had moderate knowledge about contraceptives and positive attitudes towards family planning, but in contrast to my hypotheses and previous research (Alvarez et al., 2010; Credé et al., 2012; Duong, Lee, & Binns, 2005; Eliason et al., 2013; Kulczycki, 2008; Majaraj & Cleland, 2004; Okech, Wawire, & Mburu, 2011; Salway & Nurani, 1998), no independent associations were found between contraceptive knowledge or family planning attitudes and the outcome variables. It is also possible that the measure of knowledge used in the present study, which assessed knowledge of the effectiveness of contraceptive use, may be missing important components of knowledge that are more predictive of use in this population. Consistent evidence identifies misinformation related to side effects and fears of infertility as major barriers to contraceptive use in Uganda (Nalwadda et al., 2010; UBOS & IFC International Inc., 2012) and throughout sub-Saharan Africa (Chipeta, Chimwaza, & Kalilani-Phiri, 2010; Cornman et al., 2011; Williamson et al., 2009). Thus accurate knowledge of side effects may be more important than knowledge of the effectiveness of different contraceptive methods, in this context, which our measure would not have captured as a method may still be effective despite perceived side effects. However, these findings are consistent with national trends reported in the 2011 DHS; contraceptive knowledge in Uganda is

high, while contraceptive use is low (UBOS & IFC International Inc., 2012). Similarly, previous research in Uganda found low use of contraceptives despite high acceptability and positive attitudes (Agyei & Migadde, 1995). While knowledge of and positive attitudes towards family planning are likely determinants of contraceptive use, they may be more distal factors related to use, affecting contraceptive use indirectly. For example, Hartmann et al., (2012) found partner communication mediated the relationship of contraceptive knowledge and use (Hartmann et al., 2012). Furthermore, given the findings of the influence of perceived partner attitudes on uptake of family planning services, women's attitudes may be less influential than her partner's attitudes in this context, as has been found in other studies in sub-Saharan Africa (Dodoo, 1998; Eliason et al., 2013; Mason & Smith, 2000).

Within the ABM's predisposing factors level, support was not found for the hypothesized negative association between postpartum depression and the outcomes variables, in contrast to previous studies on depression and condom use (DiClemente et al., 2001; Kennedy, 1993). In the present study, there may not have been enough women experiencing depressive symptoms to detect an effect on family planning service uptake or contraceptive use; only 11% of women met criterion for probable depression. Even among women with probable depression, no woman scored higher than 27 on a scale with a maximum score of 42. Previous research has also shown anxiety, post-traumatic stress disorder (PTSD), psychological distress, and substance abuse disorders are negatively associated with condom use and positively associated with risky sexual behavior (Hutton et al., 2001; Kennedy, 1993; Woolf-King & Maisto, 2011). There is a need to more broadly explore the influence of women's emotional status on contraceptive use postpartum.

My findings support the hypothesis that prior use of contraceptives, an enabling factor in the ABM, would be positively associated with both outcome variables. In the final multivariate models, women who had a history of contraceptive use were seven times more likely to seek family planning services and eleven times more likely to use effective contraceptive methods.

While our confidence in this finding is reduced because of large confidence intervals, the observed association is supported by previous research in postpartum samples (Do & Hotchkiss et al., 2013; Eliason et al., 2013). Past behavior is among the strongest predictors of future behavior (Ouellette & Wood, 1998), which may be a result of habit forming after consistent, repeated performance of a behavior (Ajzen, 2002; Ouellette & Wood, 1998). The effect of prior use of contraceptives may also work through increased self-efficacy. Contrary to my hypothesis, the present study found no positive association between self-efficacy to use contraceptives and the outcome variables, however, other research suggests that self-efficacy to navigate the healthcare system may be important to consider in the context of health service uptake (Gelberg, Andersen, & Leak, 2001). It was hypothesized that location of delivery may also be an indicator of self-efficacy in navigating the healthcare system. Specifically, women having delivered in a facility would be more likely to use contraceptives than women having delivered at home, because of their familiarity with health care facilities. However, no effect was found between location of delivery and either of the outcome variables. Since the sample was comprised of women who were seeking antenatal services, those women are likely more confident in navigating the health care system compared to rural Ugandan women in general. Although, Uganda has high rates of antenatal care uptake overall (95%) (UBOS & IFC International Inc., 2012). Low statistical power may also contribute to the null findings on the association between location of delivery and the outcome variables; only 11.6% of the sample reported delivering at home.

The hypothesized positive association between communication with the partner about family planning and the outcome variables was supported by the data; there was a strong association between partner communication about contraceptives and family planning service uptake and contraceptive use. The ROC curve (see Figure 5 and Figure 9) demonstrated the greatest improvement in explaining both uptake in family planning services and contraceptive use with the addition of the relationship factor block to the model. This finding lends support to a

growing body of evidence demonstrating an association between partner communication and contraceptive use (Ankomah, Anyanti, & Oladosu, 2011; Link, 2011; Oladeji, 2008; Paek et al., 2007; Sales et al., 2012; Samandari et al., 2010; Yue, O'Donnell, & Sparks, 2010). Future research should examine spousal communication about family planning further in order to gain an understanding of the dynamics and characteristics of this communication that affect family planning decision making and contraceptive use. A recent study explored the mechanisms through which communication increased family planning acceptance and utilization in a male-targeted intervention in Malawi, known as the Malawi Male Motivators Project (Hartmann et al., 2012). Changes in gendered patterns in communication about family planning initiation and increased frequency and ease of communication were identified as specific aspects of communication associated with family planning decision making and uptake (Hartmann et al., 2012). However, findings from other studies on family planning communication patterns are mixed (Robey, Ross, & Bhushan, 1996; Saleem & Isa, 2004) and researchers suggest that there is a significant amount of variation by setting (Robey, Ross, & Bhushan, 1996). Exploring the dynamics of spousal communication among couples in Uganda further may inform tailored approaches to increase communication and subsequent family planning decision making and contraceptive use.

The Malawi Male Motivators Project also identified determinants of spousal communication: the effect of communication on family planning use was often mediated through knowledge and male approval of family planning (Hartmann et al., 2012). Other studies have found a connection between communication and perceived partner opposition to family planning: when communication is lacking between couples, women often incorrectly perceive their partner's opposition to family planning and subsequently do not use contraceptives or use them in secret (Bankole & Singh, 1998; Cleland et al., 2006; Miller, Severy, & Pasta, 2004), further demonstrating the importance of partner communication. These findings may explain the high correlation between partner communication about contraceptives and perceived partner

attitudes about contraceptives (prompting us to drop perceived partner attitudes from the multivariate analysis), both of which in bivariate analyses were independently associated with family planning service uptake, as hypothesized. Similarly, research indicates women often perceive their partner's ideal family size to be larger than it actually is (Wolff, Blanc, & Ssekamatte-Ssebuliba, 2000); in reality women and men frequently want the same number of children (Bankole and Audam, 2011). Without family planning discussions between partners, women may base their decision not to seek contraceptives on this incorrect assumption. In the current study, on average women felt their partner wanted one child more than they did. Though support was not found for the hypothesized negative relationship between differences in fertility desires and uptake of family planning services or contraceptive use, there was a statistically significant negative correlation between differences in fertility desires and partner communication ($r = -0.18, p < 0.001$). Therefore, the more women perceive differences between their spouse's desires and their own, the less likely they are to communicate about contraceptives. Thus, women's perceived differences in fertility desires may not reflect actual differences in fertility desires, but may be an outcome of a lack of partner communication about fertility desires. This finding again reinforces the need for increased women's' communication with her partner in this sample. Future research should continue to explore what factors related to the spousal relationship lead to male disapproval of contraceptive use and decreased communication.

Having a history of IPV with current partner was high among women: nearly half of women reported experiencing emotional abuse (45.8%) and more than half reported physical abuse (64%), which is similar to the national rates of IPV reported in Uganda (UBOS & IFC International Inc., 2012). Furthermore, women's reported relationship control ($M=2.28, SD=0.79$) and dominance in decision making ($M=0.65, SD=0.44$) were moderate. These relationship factors, however, were not associated with the family planning outcomes assessed, in contrast to my research hypotheses and previous research identifying these as key determinants of

contraceptive use and family planning (e.g., Harvey et al., 2003; Hung et al., 2012; Wingood & DiClemente, 2000).

The present study also calls attention to the importance of perceived need for family planning, which as hypothesized, was positively associated with family planning service uptake and contraceptive use. Qualitative research should examine factors associated with perceived need among postpartum women in Uganda in more depth. Research among postpartum women in Vietnam and Bangladesh observed low perceived need for contraceptives during the postpartum amenorrhea interval because of the natural contraceptive effects of having just given birth (Duong, Lee, and Binn, 2005; Salway & Nurani, 1998). Furthermore, exclusive breastfeeding during this time can extend the period of effective contraception postpartum, known as lactational amenorrhea. Future research with postpartum women in Uganda should explore the effect of women's knowledge of postpartum and lactational amenorrhea on their perceived need and use of contraceptives.

Public health implications

In the study population, family planning educational counseling is typically given in a group setting during women's eighth month ANC visit and postpartum women are considered a priority group for family planning and contraceptive service delivery in the Ugandan Ministry of Health's national guidelines for reproductive health services (Ministry of Health, 2001). The low uptake of contraceptives reported in the present thesis highlights the need to strengthen contraceptive counseling provided during ANC and provide follow up counseling during postnatal care visits for women who have not accessed family planning but want to delay their next pregnancy. Family planning counseling may be especially effective postpartum as having recently given birth may serve as a teachable moment, which is a naturally occurring health event thought to motivate individuals to spontaneously adopt health behaviors (McBride, Emmons, & Lipkus, 2003). Furthermore, PNC visits may be the last opportunity to provide women with family planning counseling, as women may be more motivated to come to the clinic

for infant health services (e.g., immunizations) and less motivated to come back to the clinic solely for family planning purposes. However, PNC has been documented as one of the weakest aspects of reproductive health care in sub-Saharan Africa (Mwangi et al., 2008; Warren et al., 2006; Charurat et al., 2010) and while family planning counseling is included as part of the PNC service package, research suggests that it is typically overlooked in practice because of priority given to the infant's health at this time (Lagro et al., 2006; Marlow et al., 2013). Do and Hotchkiss (2013) found the intensity of use of ANC, but not PNC, to be significantly associated with postpartum use of effective contraceptives in Kenya and Zambia. The lack of influence of PNC on postpartum contraceptive use may be due to a lack of family planning counseling provided during PNC (Do & Hotchkiss, 2013). Thus, family planning counseling should be prioritized during PNC, specifically among postpartum women who want to delay their next pregnancy but have not yet accessed contraceptives. It is important to note, however, that a major barrier to providing family planning counseling postpartum in Uganda is the low rates of women who receive any postnatal care in the general population. According to the DHS survey, 64 percent of postpartum women do not receive any postnatal checkup (UBOS & IFC International Inc., 2012). However, Tann et al. (2007) demonstrated that Ugandan women's utilization of ANC increased as the quality of those services increased. Thus, strengthening the quality of PNC services may subsequently increase women's retention in care throughout the postpartum period.

While my findings on the determinants of family planning service uptake among postpartum women are similar to determinants found in studies with the general population, they may have implications for the development of targeted public health interventions among postpartum women. My findings suggest that family planning providers should encourage women to communicate with their partners about family planning. Given likely communication skill deficits between partners and social norms prohibiting female initiated discussions related to sexual health (Blanc & Wolff, 2001; Kiene et al., 2013; Nalwadda et al., 2010), increasing

family planning communication may be best accomplished by bringing men to the clinic to participate in family planning couples counseling, perhaps by incorporating it with other health services such as HIV testing or malaria treatment. Intervention studies identify partner communication as a key component to increase male involvement in and approval of family planning in sub-Saharan Africa (Hartmann et al., 2012; Shattuck et al., 2011). One challenge in such an approach is getting males to attend the clinic in the first place: qualitative research in Uganda reveals significant cultural and structural barriers to getting males to participate in ANC and family planning with women (Byamugisha et al., 2010). However, some simple intervention approaches, such as providing men with a written invitation to attend ANC with their partner have had some success in increasing the number of males participating in couples-based ANC sessions (Byamugisha et al., 2011; Mohlala et al., 2011). While the simplicity of this approach is appealing, more aggressive approaches will likely be needed in Uganda and other sub-Saharan settings. Even in communities where men control decision making related to reproductive health and service use, actively participating in family planning issues may be considered socially taboo or of little interest to men (Mosha, Ruben, & Kakoko, 2013). Other innovative approaches to increase social support for women in using contraceptives are needed (Eliason et al., 2013).

Furthermore, women's perceived need for family planning was identified in the present study as a predictor of uptake of family planning and use of contraceptives. As discussed, exploring factors influencing women's perceived need more in depth may help inform the development of interventions to increase women's uptake of services postpartum. However, the present study's findings of the influence of perceived partner attitudes and partner communication on family planning service uptake suggest women's perceived need for family planning may just be a reflection of her partner's perceived need or approval (Ezeh, 1993), or when differences exist between men and women, the male partner's perceived need may carry more weight than the female partner's (Dodoo, 1998; Mason & Smith, 2000). This again

illustrates the potential effectiveness of developing interventions that garner male support for family planning. Future research should explore factors influencing the male partner's perceived need of family planning in Uganda, in order to tailor interventions geared towards male acceptance of family planning. For example, the cost of childrearing and the health and well-being of their wife and children may be motivating factors specific to men (Fapohunda & Todaro, 1988; Wolff, Blanc, & Ssekamatte-Ssebuliba, 2000). Male-targeted family planning interventions may be more influential than programs that solely target women not only through their effect on increased male acceptance of family planning and shifts in cultural norms regarding gendered decision making (Eliason et al., 2013; Hartmann et al., 2012), but they also may enable women to overcome structural barriers to family planning services, as males typically control the enabling resources necessary to access services. For example, among couples in Uganda accessing a health facility for childbirth, men were more likely to make arrangements to overcome key access barriers related to the costs of care, distance to clinic, or transportation issues compared to women (Parkhurst et al., 2006).

Limitations

The present thesis has several limitations. Data analyzed originated from self-reported measures, which have inherent limitations related to social desirability and recall bias. Moreover, the measures from the original study selected for inclusion in the current secondary analysis were not specifically designed to examine ABM factors. The generalizability of the study is another limitation, as it may be limited due to the nonsystematic recruitment of women, as well as the recruitment of women attending ANC. Women presenting for ANC may be fundamentally different than women who are pregnant but do not seek antenatal care services in terms of the outcomes of interest. However, 95% of pregnant Ugandan women attend ANC (UBOS & IFC International Inc., 2012), minimizing this limitation. Furthermore, data were only collected from women and not men, providing only women's perceptions of their spouse's attitudes, beliefs, and behavior. Future research should recruit samples of couples in order to

more directly measure the male partner's role in contraceptive use. An additional limitation is the cross-sectional nature of the present study. While the original study collected data at two time points, a prospective analysis was not possible because many of the variables of interest were only asked at one time point.

Women in the study were in the postpartum amenorrhea interval between childbirth and the return of menstruation, which offers relatively effective natural protection from conception. The naturally occurring contraceptive effect of lactation and delayed return to sexual activity post-childbirth also increases protection from pregnancy during this time period (UBOS & IFC International Inc., 2012). It is possible that some of the null findings could be due to the fact that contraception use at this time is likely to be lower than during other times (Ross & Winfrey, 2001). It is also likely that this at least in part explains the high difference in an unmet need for family planning in the study sample (66%) compared to the DHS estimates among rural married women (37%) (UBOS & IFC International Inc., 2012). Future research with postpartum populations should follow women longitudinally at several points postpartum to gain a better understanding of whether their need for family planning is met and the timing of uptake of contraceptives postpartum. Collecting data on the return of menses and lactation practices and women's perceived fertility in such a study would also provide information on the duration of a lapse in contraception protection among women with a need for family planning. Furthermore, longitudinal research with postpartum women could compare differences between those who seek family planning and those who do not.

Though women's decreased need for contraception at the time of assessment is a limitation of the study, there are several points to consider in evaluating the susceptibility of the present sample to pregnancy, as well as the public health significance for studying determinants of family planning service uptake and contraceptive use during postpartum amenorrhea. Firstly, we are unaware how much women understand the contraceptive effects of postpartum amenorrhea. Fertility may resume before women realize since ovulation occurs before the first

return of menstrual bleeding, at which point women would likely realize they are again fertile. Second, according to DHS data, postpartum amenorrhea is on average shorter in the region of the study population than in most of the country, with menses returning on average six months postpartum for women in this region (UBOS & IFC International Inc., 2012). This means there was only a window of 3 months before menses returned for most women at the time of the survey. At the time of the survey women were returning for their final postpartum clinic visit for child vaccinations as recommended by standard ANC protocol at Gombe Hospital, thus without other motivation to return to the clinic, women who had not sought family planning services by this visit (69%) may be unlikely to return on their own for family planning services within the next three months or before the return of menses. Moreover, three months postpartum, 75.5% of the sample had begun having vaginal sex again, while only 25% of the sample reported using contraceptives, further increasing women's risk for poor spacing between pregnancies. Finally, the need for women to receive family planning services even during postpartum amenorrhea is reinforced by the nationwide statistics demonstrating short intervals between births in Uganda (Rutstein. 2011).

Another limitation of the study is the lack of contextual factors related to the health system and external environment that were available in the original study from which I conducted a secondary data analysis. Time to clinic was the only variable measured within this level; however, the literature and the Andersen Behavioral Model of Health Service Use suggests many other structural and community-level factors that may be important to contraceptive use in the context of Uganda. In a systematic review assessing access to and utilization of health services among poor and vulnerable populations in Uganda, a significant number of structural barriers in the external environment and health system were identified, with distance to service points, perceived quality of care, and availability of drugs found to be key determinants of utilization (Kiwunuka et al., 2008). Researchers have argued that in resource-limited settings such as Uganda, structural and community-level factors such as these may be

even more important to contraceptive use compared to individual-level factors typically encompassed in psychosocial theories of behavior change (Campbell, 2003; Marks, 2008; Murray and Campbell, 2003). My findings that partner communication about contraceptives and perceived partner attitudes about contraceptives were predictors of uptake of family planning and use of contraceptives may be suggestive of more upstream factors related to gender equity and gender roles at the community-level. The present study did not assess adherence to cultural norms related to gender equity and roles, which may shed light on the relationship dynamics influencing family planning decision making and contraceptive use. Cultural norms related to decision making power, gender equity, and ideal family size have been associated with condom use (Shannon et al., 2012). Relevant to the findings on partner communication, several studies in Uganda indicate prevalent cultural norms deeming communication about sex and contraception between partners, especially when initiated by women, taboo (Blanc & Wolff, 2001; Kiene et al., 2013; Nalwadda et al., 2010). The aforementioned Malawi Male Motivators Project found changes in gendered communication norms and sexual decision making norms increased the use of contraceptives and led to overall improvements in the spousal relationship (Hartmann et al., 2012), highlighting the importance of considering the present study's findings on communication and partner attitudes towards family planning within the larger cultural context of Uganda in which gender inequity norms are salient and likely shape spousal communication and decision making (Bwambale et al., 2008; Hartmann et al., 2012; Mirembe & Davies, 2001). In order to fully understand family planning service uptake and contraceptive use in Uganda, future research should explore higher level factors in the environment and health system more in depth.

Finally, while the ABM provided a theoretical framework for the present thesis, I did not formally empirically test the validity of the model in predicting family planning service uptake and contraceptive use by testing the upstream factors predicting downstream factors (e.g., predisposing factors predicting enabling factors) and the overall structural relationships of the

model. Doing so would have required validated indicators of the model's factors which were not available in the present data set, and to my knowledge have not been developed. The final model, guided by the ABM in its development, provided a good fit to the data in predicting the outcomes of interest, but future research should be conducted to test the appropriateness of the structure of the ABM in predicting contraceptive use, specifically in resource-limited settings such as Uganda.

Conclusion

Fulfilling the unmet need for family planning in Uganda and other developing countries has significant health outcomes for women and infants (Guttmacher Institute, 2009; 2010) and helps couples reach their reproductive intentions, thereby improving an array of social and economic outcomes on a population level (Westoff & Bankole, 2002; Casterline & Sinding, 2000; Sedgh et al., 2007). Uganda's unmet need for family planning is among the highest in the world (Khan et al., 2008). If this need were satisfied, the contraceptive prevalence rate would increase from 30% to 64% (UBOS & IFC International Inc., 2012) and maternal mortality would drop by 40% (Guttmacher Institute, 2009). The present study demonstrated an especially high unmet need (66%) among women approximately three months postpartum attending ANC in a rural Ugandan hospital, indicating high risk for poorly spaced pregnancy. Predisposing, enabling, relationship, and perceived need factors were identified as key determinants of postpartum women's uptake of family planning services and contraceptive use. Particularly, education, prior use of contraceptives, communication with partner about contraceptives, and perceived need were identified as determinants, and should be considered in antenatal and postnatal family planning counseling in Uganda.

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Table 1. Participant Characteristics and Descriptive statistics N=258

	%	Mean	SD	Range
Time to clinic				
0-30 min	31.8%			
31-60 min	36%			
61-120 min	21.1%			
>120 min	11.1%			
Number of children		2.37	2.29	0-10
Age		25.85	6.13	18-44
Education				
Primary or less	57.5%			
Secondary	33%			
> than secondary	9.6%			
Religion				
Catholic	33.2%			
Muslim	41.9%			
Other	24.9%			
Depression		6.61	6.24	0-42
Contraceptive knowledge		0.40	0.20	0.00-1.00
Attitudes towards contraceptive use		3.63	0.66	0-4
Self-efficacy towards contraceptive use		3.10	1.03	0-4
Prior use of contraceptives				
Yes	83.3%			
No	16.7%			
Monthly income				
0-15 USD	78.9%			
>15-50 USD	16.5%			
>50 USD	4.6%			
Location of delivery				
Home	11.6%			
Health care facility	88.4%			
Relationship control		2.28	0.79	0-4

Table 1 Continued

	%	Mean	SD	Range
Dominance in decision-making		0.65	0.44	0-2
Partner attitudes towards family planning		2.40	1.03	0-4
Any emotional abuse				
Yes	63.5%			
No	36.5%			
Any physical abuse				
Yes	45.8%			
No	54.2%			
Communication with partner about contraceptives		1.81	1.22	0-3
Male/Female Difference in fertility desires		1.10	1.72	-2.00-9.00
Perceived need of family planning		3.71	0.81	0-4
Uptake of family planning services since delivery				
Yes	31%			
No	69%			
Use of any effective contraceptives since delivery				
Yes	25.2%			
No	74.8%			

Table 2. Results of bivariate logistic regression analysis for predictors of uptake of family planning services and use of any effective contraceptives

	Uptake of family planning services since delivery n=258			Use of effective contraceptives since delivery n=258		
	OR (95% CI)	χ^2	p	OR (95% CI)	χ^2	p
Health system factors						
Time to clinic						
>120 min	1.32 (0.55-3.18)	0.37	0.54	1.67 (0.68-4.08)	1.25	0.26
61-120 min	0.81 (0.38-1.72)	0.31	0.58	0.76 (0.34-1.70)	0.44	0.51
31-60 min	0.94 (0.50-1.79)	0.03	0.86	0.76 (0.38-1.52)	0.61	0.43
0-30 min (reference)						
Predisposing factors						
Number of children						
	0.98 (0.87-1.10)	0.17	0.68	1.02 (0.90-1.15)	0.09	0.76
Age						
	0.99 (0.95-1.03)	0.33	0.57	1.01 (0.96-1.05)	0.05	0.83
Education						
> than secondary	0.95 (0.35-2.55)	0.11	0.92	0.66 (0.21-2.07)	0.50	0.48
Secondary	2.31 (1.31-4.08)	8.38	0.004**	1.71 (0.94-3.11)	3.13	0.08 [†]
Primary or less (reference)						
Religion						
Catholic	1.13 (0.18-6.93)	0.02	0.90	0.64 (0.31-1.31)	1.48	0.22
Muslim	0.59 (0.81-4.27)	0.28	0.59	0.64 (0.32-1.27)	1.66	0.20
Other (reference)						
Postpartum depression	0.97 (0.93-1.03)	1.04	0.31	0.98 (0.93-1.03)	0.57	0.45
Contraceptive knowledge	2.67 (0.73-9.75)	2.21	0.14	2.30 (0.58-9.08)	1.42	0.23
Attitudes towards family planning	1.29 (0.82-2.00)	1.20	0.27	1.09 (0.70-1.70)	0.15	0.69

Note: [†]p < .10; *p < .05; **p < .01. OR = Odds Ratio

Table 2 Continued

	Uptake of family planning services since delivery n=258			Use of effective contraceptives since delivery n=258		
	OR (95% CI)	χ^2	p	OR (95% CI)	χ^2	p
Enabling factors						
Monthly income						
>50 USD	0.69 (0.18-2.64)	0.29	0.59	0.92 (0.24-3.52)	0.02	0.90
>15-50 USD	0.71 (0.34-1.50)	0.79	0.38	0.63 (0.28-1.45)	1.19	0.28
0-15 USD (reference)						
Self-efficacy towards family planning	1.17 (0.89-1.52)	1.17	0.28	1.02 (0.77-1.34)	0.01	0.91
Prior use of contraceptives						
Yes	11.67 (2.75-49.57)	11.09	.001**	17.80 (2.40-132.14)	7.93	0.005**
No (reference)						
Location of delivery						
Health care facility	1.27 (0.54-2.99)	0.30	0.59	1.40 (0.54-3.58)	0.48	0.49
Home (reference)						
Relationship factors						
Relationship control	0.90 (0.64-1.27)	0.38	0.54	1.00 (0.69-1.44)	0.00	0.98
Dominance in decision-making	0.97 (0.53-1.79)	0.01	0.93	0.81 (0.42-1.56)	0.41	0.52
Perceived partner attitudes towards family planning	1.37 (1.04-1.81)	4.96	0.03*	1.18 (0.89-1.57)	1.29	0.26
Any emotional abuse						
Yes	1.19 (0.68-2.09)	0.37	0.54	0.97 (0.53-1.75)	0.01	0.92
No (reference)						

Note: †p < .10; *p < .05; **p < .01. OR = Odds Ratio

Table 2 Continued

	Uptake of family planning services since delivery n=258			Uptake of family planning services since delivery n=258		
	OR (95% CI)	χ^2	p	OR (95% CI)	χ^2	p
Any physical abuse						
Yes	1.06 (0.62-1.81)	0.04	0.84	1.15 (0.64-2.04)	0.23	0.64
No (reference)						
Communication with partner about contraceptives	1.79 (1.38-2.31)	19.51	<0.001**	1.86 (1.39-2.48)	17.83	<0.001**
Male/Female Difference in fertility desires	0.87 (0.73-1.04)	2.48	0.12	0.92 (0.77-1.09)	0.96	0.33
Need						
Perceived need of family planning	3.21 (1.29-7.96)	6.33	0.01*	2.59 (1.10-6.09)	4.75	0.03*

Note: †p < .10; *p < .05; **p < .01. OR = Odds Ratio

Table 3. Results of multivariate hierarchical logistic regression model for predictors of uptake of family planning services and use of any effective contraceptives

Model	Uptake of family planning services since delivery n=258				Use of effective contraceptives since delivery n=258			
	AOR (95% CI)	χ^2	df	p	AOR (95% CI)	χ^2	df	p
Block 1 Predisposing factors		9.08	2	0.01*		4.47	2	0.11
Education								
> than secondary	0.95 (0.35-2.55)	0.11		0.92	0.66 (0.21-2.07)	0.50		0.48
Secondary	2.31 (1.31-4.08)	8.38		0.004**	1.71 (0.94-3.11)	3.13		0.08 [†]
Primary or less (reference)								
Block 2 Enabling factors		21.24	1	<0.001***		19.98	1	<0.001***
Education								
> than secondary	0.80 (0.29-2.20)	0.18		0.67	0.56 (0.18-1.76)	0.99		0.32
Secondary	2.26 (1.25-4.07)	7.30		.007**	1.63 (0.88-3.01)	2.40		0.12
Primary or less (reference)								
Prior use of contraceptives	11.82 (2.76-50.59)	11.08		<0.001**	18.11 (2.43-134.83)	8.00		0.005**
Block 3 Relationship factors		19.62	1	<0.01**		17.86	1	<0.001***
Education								
> than secondary	0.67 (0.24-1.87)	0.59		0.44	0.46 (0.14-1.49)	1.68		0.20
Secondary	2.81 (1.49-5.30)	10.16		0.001**	1.95 (1.02-3.74)	4.04		0.04*
Primary or less (reference)								
Prior use of contraceptives	9.13 (2.06-40.42)	8.50		0.004**	13.25 (1.74-100.72)	6.23		0.01*
Communication with partner about contraceptive use	1.79 (1.336-2.37)	17.06		0.00**	1.82 (1.34-2.45)	15.10		0.00**

Note: χ^2 , df, p are reported for the each block; [†]p < .10; *p < .05; **p < .01; ***p < .001 AOR = Adjusted Odds Ratio, adjusted for variables included in the model

Table 3 Continued

Model	Uptake of family planning services since delivery n=258				Use of effective contraceptives since delivery n=258			
	AOR (95% CI)	χ^2	df	p	AOR (95% CI)	χ^2	df	p
Block 4 Need		59.44	1	<0.001***		5.29	1	0.02*
Education								
> than secondary	0.68 (.024-1.92)	0.54		0.46	0.47 (0.15-1.52)	1.59		0.21
Secondary	3.03 (1.58-5.82)	11.09		.001**	2.04 (1.05-3.95)	4.45		0.04*
Primary or less (reference)								
Prior use of contraceptives	7.15 (1.58-32.37)	6.53		0.01*	11.03 (1.420-83.05)	5.22		0.02*
Communication with partner about contraceptive use	1.79 (1.36-2.37)	16.95		<0.001***	1.81 (1.34-2.44)	14.89		<0.001***
Perceived need of family planning	2.57 (1.09-6.08)	4.63		0.03*	2.06 (0.91-4.65)	3.02		0.08 [†]

Note: χ^2 , df, p are reported for the each block; [†]p < .10; *p < .05; **p < .01; ***p < .001 AOR = Adjusted Odds Ratio, adjusted for variables included in the model

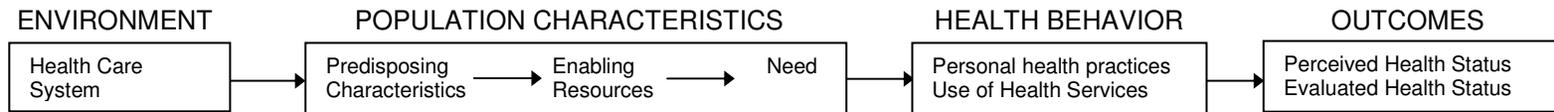


Figure 1. Andersen's Behavioral Model of Health Services Use

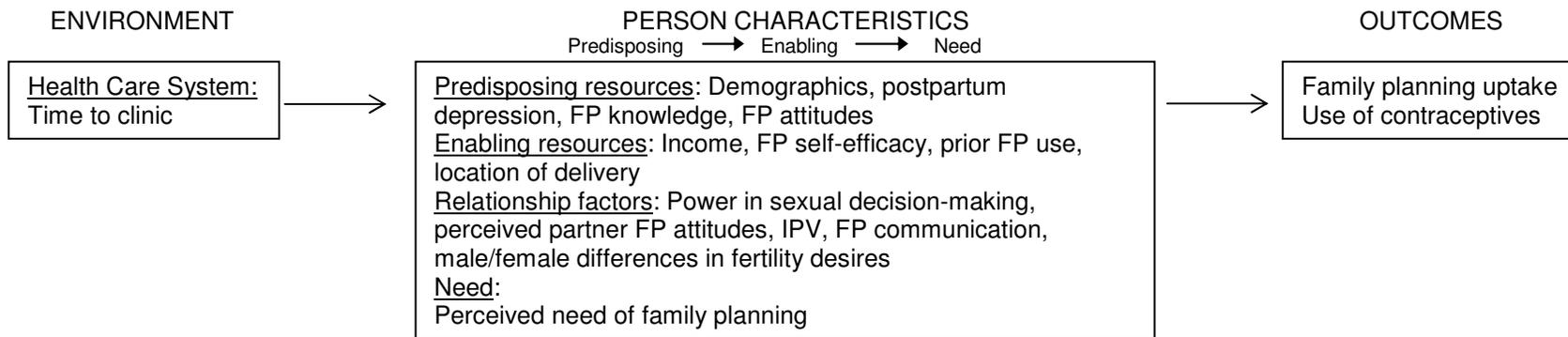


Figure 2. Independent variables and outcome variables mapped on to the theoretical framework: Andersen's Behavioral Model of Health Services Use. Note: FP=family planning.

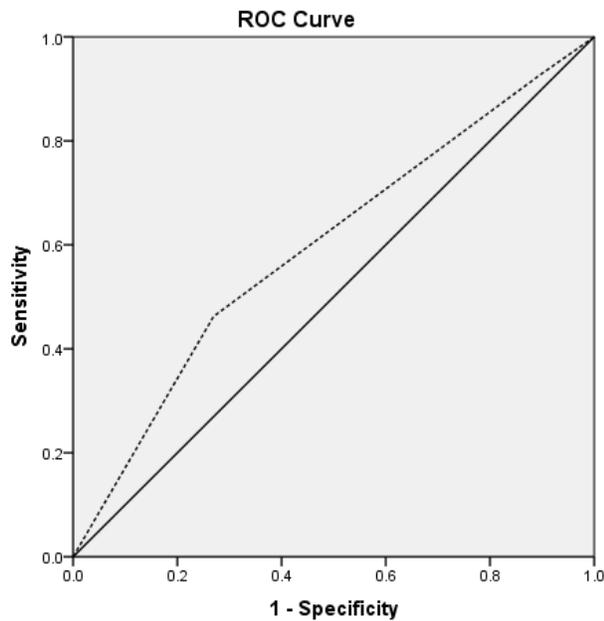


Figure 3. Receiver operating characteristic (ROC) curve for block 1 (enabling factors) predicting family planning service uptake. Area under curve = 0.60. 95% CI (0.52-0.67), $p=0.01$. The dotted line is the ROC curve. The solid diagonal line is the line of no discrimination.

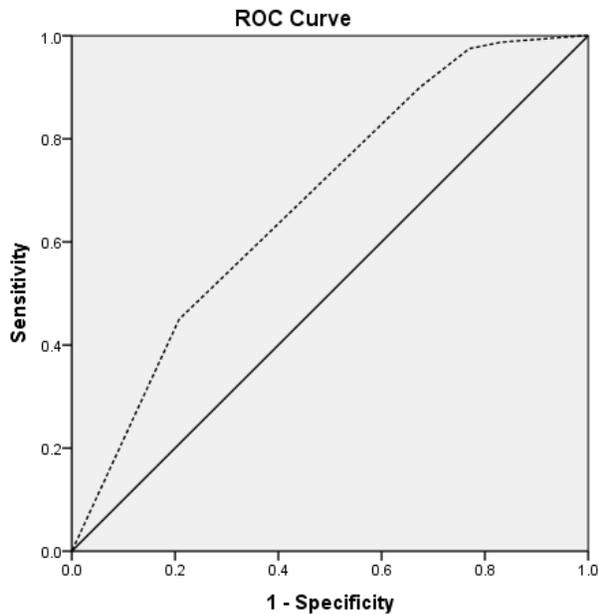


Figure 4. Receiver operating characteristic (ROC) curve for block 2 (predisposing factors) predicting family planning service uptake. Area under curve = 0.68, 95% CI (0.61-0.75), $p<.001$. The dotted line is the ROC curve. The solid diagonal line is the line of no discrimination.

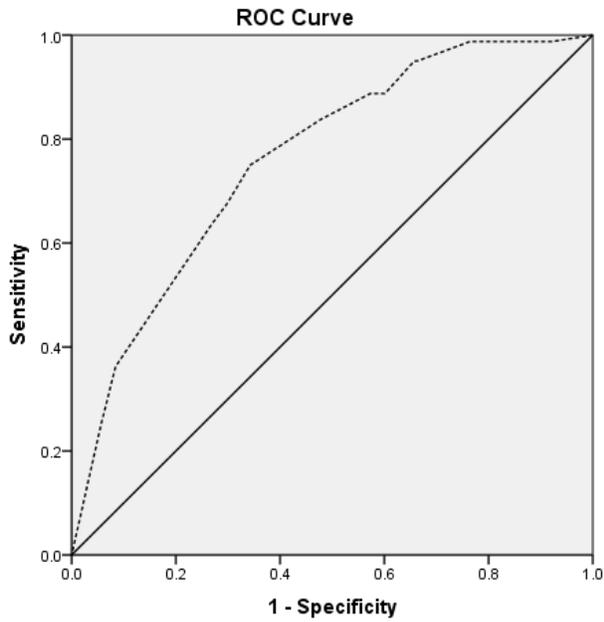


Figure 5. Receiver operating characteristic (ROC) curve for block 3 (relationship factors) predicting family planning service uptake. Area under curve = 0.76, 95% CI (0.70-0.82), $p < .001$. The dotted line is the ROC curve. The solid diagonal line is the line of no discrimination.

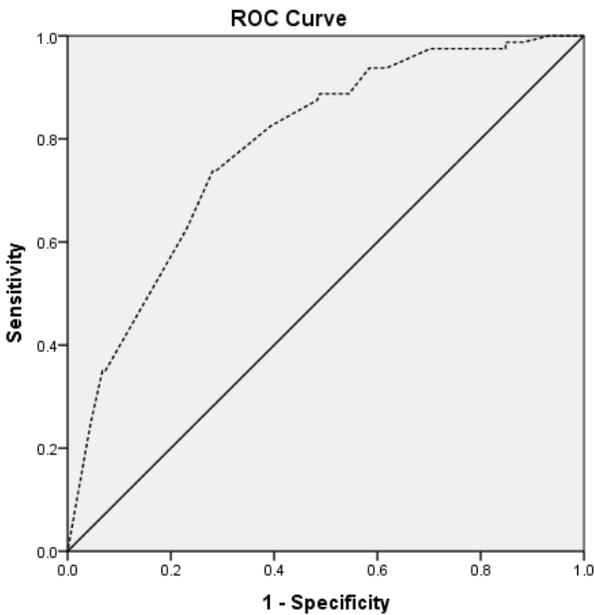


Figure 6. Receiver operating characteristic (ROC) curve for block 4 (need) predicting family planning service uptake. Area under curve = 0.79, 95% CI (0.73-0.84), $p < .001$. The dotted line is the ROC curve. The solid diagonal line is the line of no discrimination.

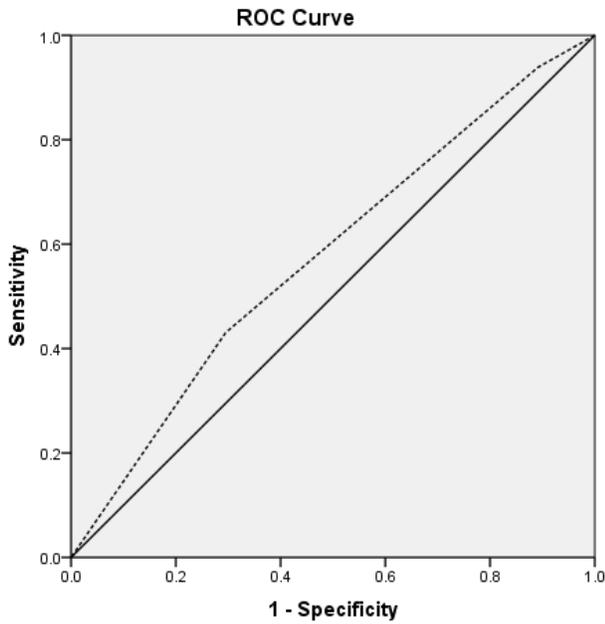


Figure 7. Receiver operating characteristic (ROC) curve for block 1 (enabling factors) predicting contraceptive use. Area under curve = 0.58. 95% CI (0.50-0.66), $p=0.06$. The dotted line is the ROC curve. The solid diagonal line is the line of no discrimination.

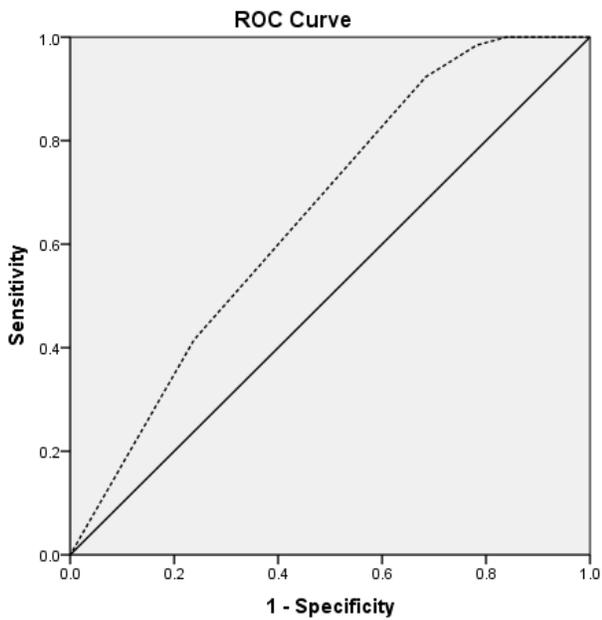


Figure 8. Receiver operating characteristic (ROC) curve for block 2 (predisposing factors) predicting contraceptive use. Area under curve = 0.66, 95% CI (0.59-0.73), $p<.001$. The dotted line is the ROC curve. The solid diagonal line is the line of no discrimination.

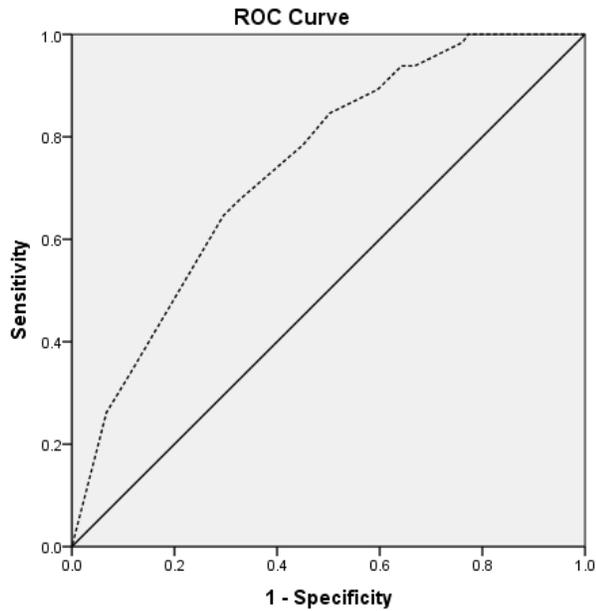


Figure 9. Receiver operating characteristic (ROC) curve for block 3 (relationship factors) predicting contraceptive use. Area under curve = 0.74, 95% CI (0.68-0.81), $p < .001$. The dotted line is the ROC curve. The solid diagonal line is the line of no discrimination.

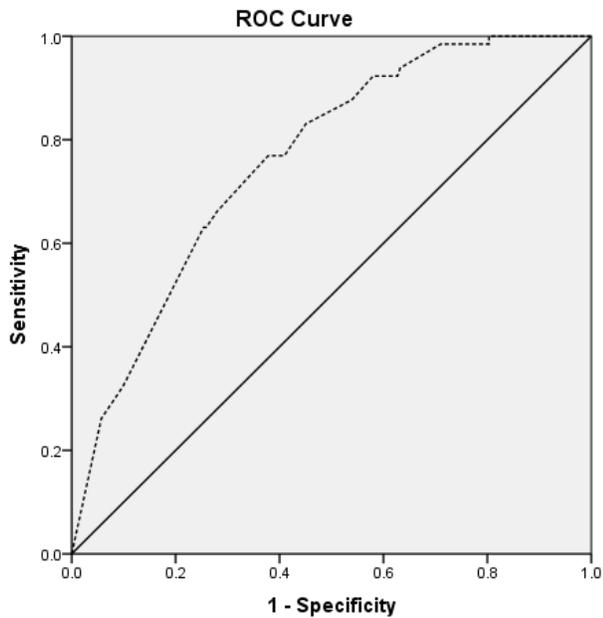


Figure 10. Receiver operating characteristic (ROC) curve for block 4 (need) predicting contraceptive use. Area under curve = 0.76, 95% CI (0.70-0.82), $p < .001$. The dotted line is the ROC curve. The solid diagonal line is the line of no discrimination.