Understanding the Mechanism through Which Unfavorable Social Norms Affect Contraceptive Use

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Abstract

Background: Few theories of health behavior explicitly take the effect of social norms on behavior into account. The ones that do assume that the effect of norms on behavior operates through motivation. We use a behavior model that is new to public health to test whether norms affect behavior through motivation or ability.

Methods: This study uses data from a household survey of Nigerian women, ages 14-24. The survey collected data on socio-economic and demographic characteristics of women, whether they were sexually experienced, and whether they used contraception. The survey also collected data on descriptive and injunctive norms around premarital sex and contraceptive use. Multivariate logistic regression was used to test whether the effect of unfavorable social norms on modern contraceptive use operates through motivation or ability.

Results: The data was used to construct variables measuring unfavorable social norms, motivation, ability, and modern contraceptive use. After adjusting for a range of socio-economic and demographic variables, we found that unfavorable social norms had a statistically significant negative effect on contraceptive use. The analysis suggests that the effect of unfavorable social norms on contraceptive use operates through ability.

Conclusion: This study sheds light on the pathway through which social norms affect contraceptive use. The findings suggest that public health interventions may be able to counter the negative effects of unfavorable social norms on modern contraceptive use by increasing women's ability to practice contraception. These findings have important implications for the design of interventions that aim to increase contraceptive use among young women in Nigeria. The study also demonstrates the utility of the FBM, a practitioner-friendly, behavior change model, in examining the relationship between norms and behavior.

Background

In recent years, there has been an upsurge of interest in social norms and their effects on behavior. Major public donors such as the United States Agency for International Development [1], the Foreign and Commonwealth Office of the United Kingdom [2] and private donors such as the Bill & Melinda Gates foundation [3-4] have made programmatic and learning investments to better understand the impact of normative interventions. More recently, the global vaccine alliance, GAVI, has included gender norms as an essential part of its 5.0 strategy.

The interest in norms comes from a growing recognition that development efforts have largely focused on nonsocial components [5] such as ensuring the availability of immunizations at health facilities or ensuring that trained providers are available to provide quality labor and birth services. While there is no denying the importance of these nonsocial components, there is increasing recognition among donors and practitioners that the impact of social factors has been vastly underestimated [6]. This comes from

the realization that, for example, immunization rates are far below expected levels in contexts where vaccines are widely available or that the uptake of contraceptive services is well below what would be expected based on the unmet need for contraception.

The growing interest among donors and practitioners in the role of social factors in the human environment, and in social norms, is welcome. At the same time, it is critical to recognize an important limitation in the social and behavioral sciences: while there are more than 80 theories of health behavior [7], few theories have taken normative change into account. We believe that, for donor interest to translate into an allocation of resources that systematically takes normative factors into account, it is important to locate social norms within a practical model of behavior change - one that is accessible to a broad range of stakeholders. Such a model could play a central role in helping donors and practitioners develop a consistent understanding of the effects of norms on behavior. The absence of such a model may impede public health practitioners from implementing normative interventions within a behavior change framework.

Most of the commonly used theories of health behavior such as the Health Belief Model, the Transtheoretical Model, and the Social Ecological Model do not explicitly address social norms. The Theory of Reasoned Action (TRA), and its extension the Theory of Planned Behavior (TPB), are perhaps the only commonly used theories that include an explicit consideration of social norms as drivers of behavior. The TRA explains an individual's behavior in terms of the underlying motivation to perform an action. It considers the intention to perform an action to be, in part, determined by social norms or the "perceived social pressure" to perform that action. The TPB differs from the TRA only in that it adds perceived behavioral control as an additional determinant of motivation [8].

Another theory of human behavior used to design health and development interventions, the Social Cognitive Theory (SCT), is based on the idea that a person learns from observing the behavior of others and adopts a behavior if she receives positive reinforcement for it. The SCT considers the concept of self-efficacy, or a person's ability to persist with an action despite challenges, as critical to the adoption of a behavior [9]. Individual ability is important in the SCT, with the function of health interventions being to deliberately increase a person's confidence in their capacity to adopt and sustain a behavior. While norms are not measured explicitly in the SCT, Bandura considers their function to be to encourage a new behavior by generating an individual's anticipation of the positive consequences of adopting the behavior [10]. Thus, the SCT considers the function of norms to support or arrest the development of individual ability [11].

Social Norms Theory (SNT) itself, a theory which is not used frequently to design public health interventions in low-and-middle-income countries, highlights the role of peer influences in individual decision-making. This theory makes the distinction between "perceived" and "real" norms. According to this theory, peer influences, affected by perceived rather than real norms, become the basis for misperceptions that lead to unhealthy behaviors such as excessive alcohol consumption. Interventions that correct these misperceptions are expected to lead to a reduction in problematic behaviors [12]. The

SNT highlights the importance of presenting correct information about peer group norms to drive changes in behavior but does not directly link norms to either motivation or ability. It assumes a direct effect of norms on behavior.

Given the limited attention to norms in health behavior change theories, it is perhaps not surprising that there has been little experimentation to determine whether norms affect behavior through motivation or ability. This investigation is important because of its implications for the design of public health interventions: the design of an intervention to increase motivation may be quite different from that of an intervention to increase ability. For example, an intervention may increase a young woman's motivation to practice contraception by increasing community dialogue about the negative consequences of unwanted teenage pregnancy, while another intervention may increase her ability to practice contraception by making contraceptives widely available in the community and ensuring that she knows how to access contraceptive services.

In this study, we use the Fogg Behavior Model (FBM) to test the mechanism through which norms affect contraceptive use. The FBM states that behavior happens when motivation, ability and a prompt occur in the same moment. In other words, motivation and ability must both be present for behavior to occur. Several other practitioner-friendly models of behavior also consider motivation and ability to be critical for behavior to occur. For example, the widely known COM-B model states that the capacity (C) for a behavior, the opportunity for the behavior to take place (O), and the motivation (M) to adopt it must be present for the behavior (B) to occur [13]. Likewise, the Opportunity, Ability and Motivation (OAM) model, used widely in social marketing, highlights the importance of motivation and ability for behavior [14].

The FBM model can be visualized in two dimensions, with motivation on the y-axis and ability on the x-axis, as shown in Figure 1. For a specific behavior, motivation can range from high to low, as can ability. The FBM states that a person with high motivation and high ability will adopt a behavior when prompted. By contrast, a person with low motivation and low ability will not adopt a behavior when prompted [15]. Using panel data from household surveys, a recent study found a significantly higher odds of condom use among men with high motivation and high ability compared to men with low motivation and low ability. Men with high motivation and high ability also had a significantly higher odds of condom use compared with men who had high levels of one but not both (i.e. either high motivation or high ability). In other words, the study found an interaction between motivation and ability [16], as suggested by the FBM.

An advantage of using the FBM over other practitioner-friendly models of behavior is that it provides clear and specific definitions of the components of motivation and ability. Fogg identifies 3 core motivators: sensation (characterized by pleasure and pain), anticipation (characterized by hope and fear) and belonging (characterized by acceptance and rejection). He identifies 5 core elements within ability: time, money, mental effort, physical effort, and routine. Because it considers both motivation and ability to be critical elements needed for behavior to change, the FBM allows us to test whether the effect of norms on contraceptive use operate through motivation or through ability.

Methods

Survey Design and Data Collection

The data collection was conducted by the Centre for Research Evaluation Resources and Development (CRERD), a non-governmental organization focused on understanding how population and health services are delivered in Nigeria. Between 2015 and 2018, CRERD conducted 5 rounds of the Performance Monitoring for Action (PMA2020) surveys in Nigeria for the Bill & Melinda Gates Institute for Reproductive Health. PMA2020 collected data on Lagos, Kaduna, and Kano [17]. A representative number of geographic clusters ("enumeration areas") were sampled in these states. Households were listed and mapped in each enumeration area.

With permission from the Bill & Melinda Gates Foundation, CRERD used the PMA2020 Nigeria sample frame in Lagos, Kaduna, and Kano to draw the sample for this survey. Systematic random sampling was used to select households. Within households, women ages 14-24 were eligible for the study. The training of interviewers was conducted in Abuja, the capital, between February 13th and 17th, 2018. Training was conducted using paper versions of the instrument before android phones were used for survey data collection. Two pilots were conducted in Niger state before the instrument was finalized (see Additional file 1 for the study questionnaire). The data collection was conducted between February 19 and March 4, 2018.

Most interviewers selected to conduct the survey had conducted surveys for CRERD in the past. Spatial data was used to ensure that each interviewer went to the location they were assigned. The Open Data Kit software captured GPS co-ordinates verified using Google Earth. This allowed survey managers to determine whether the location in which the interview was conducted was correct. A performance dashboard was used to monitor interviewer error, the time taken for each interview, and the number of interviews completed per day by an interviewer.

Operationalization of the Fogg Behavior Model: *Motivation and Ability*

To operationalize the FBM, we reviewed the survey instrument and identified survey items that were consistent with Fogg's definition of motivation and ability. Concurrently, we reviewed the broader literature and identified motivation and ability factors that predict contraceptive use [18-28]. We then classified questions in the survey instrument into motivation or ability categories.

Thirty-two survey questions were identified that reflected motivation and 25 that reflected ability. The behavior of interest was a woman's self-reported use of modern contraception. Bivariate analysis showed that 9 of the 32 questions representing motivation and 7 of the 25 questions representing ability did not have a statistically significant relationship with modern contraceptive use at the bivariate level (at $p < 0.05$). These 16 questions were not retained for further analysis, leaving 23 questions to represent motivation and 18 questions to represent ability.

Table 1 shows the 23 questionnaire items representing motivation that were used in our analysis. To measure sensation, respondents were asked about the extent to which they agreed or disagreed with statements such as “condoms ruin the mood” or “contraceptives reduce a man’s sexual urge”. To measure anticipation, women were asked about their agreement or disagreement with statements such as “condoms prevent pregnancy” or “condoms have holes that allow HIV to pass through them”. Belonging was measured by asking respondents to agree or disagree with statements such as “adolescent girls who have sex before marriage should feel ashamed” or “women who use contraceptives may become promiscuous”.

Most motivation variables were measured on a 4-point scale going from strongly agree to strongly disagree, with a “don’t know” option provided. Two of the 23 variable which fell under motivation had binary response options: “have you and your partner ever discussed the number of children you would like to have” and “do you intend to talk to your partner about contraception in the next 3 months”. Each of these two questions had a maximum score of 1. The remaining 21 questions had a maximum score of 4. Motivation variables were recoded so that their values went from low to high. Based on the addition of scores on individual variables, each survey respondent received a motivation score. Motivation scores ranged from 26 to 87.

Table 2 shows the 18 questionnaire items representing ability. The survey instrument did not have measures of time, money, or physical effort. Ability questions available in the instrument primarily reflected mental effort. Respondents were asked to agree or disagree with statements such as “using condoms during sexual intercourse is embarrassing” or “how easy or difficult would it be for you to use condoms with a sexual partner”. One question was available on routine: “do you carry condoms with you?”

Most ability variables were measured on a 4-point scale. Two of the 18 ability variables had binary response options: “do you carry condoms with you” and “do you know of a place where you can obtain a method of contraception”. Each of these questions had a maximum score of 1. The remaining 16 questions had a maximum score of 4. Ability variables were also recoded so that their values went from low to high ability. Based on the addition of scores on individual variables, each survey respondent received an ability score. Ability scores ranged from 16 to 66. For both motivation and ability variables, missing values were recoded to the mean. For most variables, missing values were less than 5%.

Social Norms

A range of disciplines including sociology, economics, gender studies and psychology have been interested in the influence social norms on human behavior. A social norm is what people in a group consider to be a typical and appropriate behavior [29]. It is held in place by reciprocal expectations of members of an individual’s reference group [5]. Cialdini [30] provided clarity to the concept of social norms by distinguishing two key types of social norms: a **descriptive** norm is what a person believes relevant others around her do while an **injunctive** norm is what a person believes relevant others expect her to do.

In other words, a descriptive norm is a person's perception of how widespread a specific behavior is while an injunctive norm is a person's perception of whether that behavior is socially approved. For example, the descriptive norm around premarital sex among young women in one context may be that unmarried women do not have sex before marriage. The injunctive norm in such a context may be that women who have sex before marriage are considered promiscuous.

We classified normative questions available in the Nigeria survey into two categories: descriptive or injunctive. Bivariate analysis showed that 7 of the 19 questions in the survey that reflected norms had a statistically significant relationship with modern contraceptive use. These 7 questions were retained for further analysis. Norms questions were recoded so that a higher score indicated a more unfavorable view of premarital sex and contraceptive use.

Table 3 shows descriptive and injunctive norms related to premarital sex and contraceptive use captured through questions asked in the survey. Questionnaire items reflecting descriptive norms include "most of my friends are having sex before marriage" and "most adolescent girls talk to their boyfriends about contraceptives". Questionnaire items representing injunctive norms include "most of my friends think that adolescents who do not have sex before marriage are old-fashioned" and "a woman who uses contraception without her husband's knowledge should be punished". Based on the addition of scores on individual variables, each survey respondent received a norms score. Norms questions were measured on a 4-point scale. The norms score ranged from 7 to 28.

The Outcome Variable: *Modern Contraceptive Use*

Modern contraceptive use was the outcome of interest for this study. Respondents were asked "Are you currently doing something or using any method to avoid getting pregnant?" Women who responded in the affirmative were asked about the method of contraception they were currently using. Women were asked about the following modern methods: the IUD, the injectable, the implant, the oral contraceptive, the male condom, the female condom, the diaphragm, the foam or jelly, and the Standard Days. Women who were currently using any of these methods were classified as modern contraceptive method users. Women were also asked about the use of traditional methods, including lactation amenorrhea, withdrawal and rhythm. Traditional methods are not included in our definition of modern method.

Statistical Analysis

Frequency distributions of socio-economic and demographic characteristics of the sample were calculated. Cross tabulations were conducted to show the relationships between categorical variables and the outcome of interest, modern contraceptive use. Chi-square tests of independence were conducted at the bivariate level. ANOVA was used to show the relationships between contraceptive use and social norms, motivation and ability. We tested the following hypotheses:

H1: Social norms that are unfavorable to premarital sex and contraceptive use have no effect on the level of modern contraceptive use among young Nigerian women.

H2: The negative effect of unfavorable social norms on contraceptive use operates through women's motivation to practice modern contraception.

We tested the relationship between social norms and contraceptive use in a multivariate framework. We used a logistic regression model [31] for the analysis, with the log odds of the outcome modelled against a linear combination of explanatory variables. The clustering of observations (i.e. clustering of women within localities) was taken into account by using the STATA cluster command.

We introduced variables in stages, using an approach similar to path analysis, where the variance explained by variables introduced later in the model helps explain the variance of variables introduced earlier in the model. Four models were used. The first model shows the odds of contraceptive use by socio-economic and demographic characteristics. The second model adds a variable measuring unfavorable social norms. This model explains whether there is a relationship between social norms and contraceptive use, independent of other factors. The third model adds a variable measuring motivation, and the fourth model adds a variable measuring ability. Models 3 and 4 help illustrate whether the effect of unfavorable social norms operates through motivation or ability. A p-value of 0.05 was used as a threshold for tests of statistical significance conducted in this study. The analyses were conducted in STATA Version 15.

Study Limitations

One of the limitations of this study is the use of existing data from a survey which was not specifically designed to collect data on the constructs articulated by the FBM. As a result, several important elements which comprise ability in the FBM (e.g. time, money, physical effort) were not measured in our study. Another limitation of this study is the reliance on self-reported behavior, which may be influenced by social desirability or recall bias [32]. Finally, because we use cross sectional survey data, no causal inferences can be drawn from the analysis.

Ethics Review

All protocols were carried out in accordance with relevant guidelines and regulations. Informed consent was obtained from all study participants.

CRERD obtained IRB approval for the study from the National Health Research Committee (NHREC) on the 24th of January 2018 – NHREC/01/01/2007-24/01/2018. Tulane University Biomedical IRB approved the study on February 16th 2018 – IRB reference number 2017-6388.

Results

In all, 1,901 women ages 14-24 were interviewed. Women were interviewed in one Southern state, Lagos (n=604), and in the Northern states of Kaduna (n=651) and Kano (n=646). Of these respondents, 628 women reported being sexually experienced. These women were either married or had a boyfriend. Data

on the outcome, modern contraceptive, use was missing for 10 women. Women with missing data were dropped from the analysis. Further analysis was conducted with data from 618 women. Current use of modern contraception was 27% among these women. Condoms were the primary modern method being used, with 64% of current modern method users reporting the use of condoms.

Socio-demographic Characteristics of Women and Modern Contraceptive Use

Column 1 of Table 4 shows the frequency distributions of characteristics of women in the sample. About one-third of women were from the South and two-thirds were from the North. Slightly more than a quarter of respondents were adolescents, ages 14-19. Nearly half of women in the sample did not have a child. About 64% of women were married. Nearly two-thirds of women had secondary education and 14% had higher than secondary education.

Column 2 of Table 4 shows reported contraceptive use among women in the sample. Contraceptive use was higher in the South compared to the North: 34% of women in the South compared to 24% in the North used a modern contraceptive method ($p<0.05$). There was no statistically significant difference in contraceptive use by age. Women without a child were significantly more likely to use a contraceptive: 33% of women without a child reported contraceptive use compared with 21% of women who had one or more children ($p<0.01$). Women with boyfriends were more likely to use a contraceptive method compared with women who were married (42% versus 19%, $p<0.001$). Women with higher than secondary education were more likely to use a contraceptive method (48%) compared with women with secondary (25%) or lower than secondary education (20%) ($p<0.001$). The poorest women, women in the first quintile, were less likely to use a contraceptive method (15%) than other women (30%) ($p<0.01$).

Unfavorable Social Norms, Motivation, Ability and Modern Contraceptive Use

Figure 2 presents ANOVA results showing modern contraceptive use by women's scores on social norms, motivation, and ability variables. Women who were not using a modern contraceptive method had a significantly higher score on the unfavorable social norms variable compared with women who were using modern contraception (18.8 versus 16.0, $p<0.001$). Women who were using contraception had higher motivation (67.7 versus 58.0, $p<0.001$) and higher ability (46.5 versus 34.8, $p<0.001$) than non-users.

Motivation, Ability and Modern Contraceptive Use: Regression Analysis

Logistic regression analysis, shown in Table 5, reveals significant associations between modern method use and socio-economic and demographic characteristics, social norms, motivation, and ability. Model 1, in Table 5, shows the relationship between socio-economic and demographic characteristics and contraceptive use. After adjusting for age, number of children, marital status, education, and wealth, there was no statistically significant difference in contraceptive use by region. Women ages 20-24 were significantly more likely to use a modern contraceptive method compared with women 14-19 (aOR=1.68, $p<0.05$). Women with a boyfriend were more likely to use contraception than married women (aOR=3.42,

$p < 0.001$). Women in the poorest quintile were significantly less likely to report using contraception (aOR=0.49, $p < 0.01$). Once wealth and other variables were included in the model, education was not associated with contraceptive use.

In Model 2, we introduced the variable measuring social norms. Even after adjusting for socio-economic and demographic characteristics, there was a significant negative association between social norms unfavorable to premarital sex and contraceptive use and the use of contraception. A higher score on norms unfavorable to pre-marital sex and contraception was associated with lower contraceptive use (aOR=0.90, $p < 0.001$).

In Model 3, we introduced a variable measuring motivation to use contraception. Higher motivation to use contraception was associated with higher contraceptive use (aOR=1.07, $p < 0.001$). It is important to note that there was no change in the relationship between social norms and modern contraceptive use after motivation was introduced in the model. This suggests that the effect of social norms on contraceptive use does not operate through motivation.

In Model 4, we introduced a variable measuring ability. An increase in the ability to use contraception was associated with higher contraceptive use (aOR=1.06, $p < 0.001$). There was no change in the relationship between motivation and contraceptive use after the introduction of ability in the model, indicating that motivation and ability had independent effects on contraceptive use. We also found that the social norms variable was no longer associated with contraceptive use once ability was introduced to the model. This suggests that the effect of social norms on modern contraceptive use operates through ability. In other words, norms that are unfavorable to premarital sex and contraceptive use negatively affect contraceptive use by lowering women's ability to use contraception.

Model 4 also suggests that the poorest women lack resources to use contraception: the negative association between being in the poorest quintile and contraceptive use disappeared once ability was introduced to the model. This is an important finding and suggests that the lower level of contraceptive use among the poorest women stems from a lower ability to use contraception, rather than from lower motivation.

Discussion

The increasing interest in the influence of social norms on behavior among public health practitioners, researchers, and donors highlights the need for a practitioner-friendly behavior model that links norms to behavior. By allowing empirical testing of the pathways through which norms influence behavior, such a model would allow evidence to be generated, systematically, on the relationship between norms and behavior. In turn, identifying the pathway through which norms influence behavior will allow interventions that are consistent with that pathway to be designed and implemented. Only one commonly used theory, the Theory of Reasoned Action (TRA), and its extension the Theory of Planned Behavior (TPB), explicitly take norms into account as determinants of behavior. These theories assume that norms influence

behavior through motivation and do not consider the possibility that norms may influence behavior through another potential pathway, ability.

In this study, we tested a model of behavior that is new to public health. The Fogg Behavior Model (FBM) states that behavior happens when motivation, ability and a prompt happen in the same moment. In the FBM, motivation is conceptualized as stemming from a person's hopes and fears related to the behavior, the pleasure or pain they experience from the behavior, and what the behavior means for their sense of belonging. Ability is comprised of practical factors such as time, money, physical effort, as well as factors such as mental effort and routine. Because it considers both motivation and ability as important drivers of behavior, the FBM provides us with the opportunity to test whether norms influence contraceptive use through motivation or through ability.

Consistent with the literature, we find that social norms that are unfavorable to premarital sex and contraceptive use are associated with lower levels of contraceptive use [20]. Moreover, the findings suggest that the effect of norms on behavior operates through ability. This is an important finding. It suggests that health interventions that increase women's ability to use contraception, may be able to overcome the negative effects of unfavorable social norms on contraceptive use.

The ability component measured in our study was the mental effort required to adopt contraception. This construct comprised of the embarrassment associated with contraceptive use, the challenge women face in discussing contraceptive use with their partner, their lack of confidence in being able to obtain a contraceptive method when they need it, their lack of confidence in being able to convince their partner to use contraception, as well as not knowing where to access contraceptive services. Indeed, well designed public health interventions that aim to increase contraceptive use do focus on many of these factors. That norms operate through ability is a welcome finding because ability is easier to change than motivation [15]. Motivation is less reliable than ability – it comes in waves. While a motivational boost can be useful in initiating a new behavior, it cannot be relied upon for sustaining that behavior [15].

To the best of our knowledge, previous studies have not explicitly tried to test the potential pathways through which norms influence contraceptive use. Studies have generally assumed that norms affect behavior through motivation. This study contributes to the literature by empirically testing whether norms affect behavior via motivation or via ability. Indeed, whether norms operate through motivation or ability has important implications for program design. Many public health interventions, such as social marketing interventions, have considerable experience in increasing the ability of target audiences to adopt new behaviors. They do so by providing practical solutions: subsidizing the price of contraceptives, making contraceptives widely available, and enabling couples to overcome the feeling of embarrassment when discussing contraceptive use with their partner [16, 23, 28]. Had we assumed that norms influence contraceptive use through motivation, our conclusions and their implications for program design would have been very different.

We cannot generalize from a study focused on a specific behavior (modern contraceptive use) whether social norms operate through ability for other behaviors as well. This is an empirical question that should

be answered through the collection and analysis of data on norms related to specific behaviors. Our analysis highlights the important, independent effects of motivation and ability on behavior. It illustrates the need to test the effects of norms on behavior using a behavior model that allows multiple pathways of effects to be explored. The study finds that the FBM is an extremely useful model for testing the pathways through which norms affect behavior.

Declarations

Ethics approval and consent to participate

All protocols were carried out in accordance with relevant guidelines and regulations. Informed consent was obtained from all study participants.

CRERD obtained IRB approval for the study from the National Health Research Committee (NHREC) on the 24th of January 2018 – NHREC/01/01/2007-24/01/2018. Tulane University Biomedical IRB approved the study on February 16th 2018 – IRB reference number 2017-6388.

Consent for publication

Not applicable

Availability of data and materials

The dataset used for the study is available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have not competing interest.

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Author's contributions

S.A. wrote the main manuscript text and conducted part of the data analysis. B.M. conducted the data analysis and interpretation. H.A. assisted with the write-up. S.P. assisted with the literature review and the interpretation. J.P.B. reviewed and improved the write-up of the manuscript. B.L.G. guided the statistical analysis. All authors reviewed the manuscript.

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Tables

Table 1. Motivation questions that correspond to the Fogg Behavior Model

MOTIVATION COMPONENT	Questions from survey used in the analysis
	<i>Please tell me if you strongly agree, somewhat agree, somewhat disagree or don't know.</i>
Sensation	407. Sex is unnatural with condoms.
Sensation	408. Condoms ruin the mood.
Sensation	545. Contraceptives reduce a woman's sexual urge.
Sensation	546. Contraceptives reduce a man's sexual urge.
Anticipation	412. Condoms prevent pregnancy.
Anticipation	414. Condoms have holes that allow HIV to pass through them.
Anticipation	547. Contraceptives can cause cancer.
Anticipation	549. Contraceptives are dangerous to your health.
Anticipation	420a. How motivated or unmotivated are you to use condoms with your partner? Very motivated, somewhat motivated, unmotivated, very unmotivated or don't know.
Anticipation	535a. How motivated or unmotivated are you to discuss contraception with your partner? Very motivated, somewhat motivated, unmotivated, very unmotivated or don't know.
Anticipation	566. How motivated on unmotivated are you to use contraception? Very motivated, somewhat motivated, unmotivated, very unmotivated or don't know.
Anticipation	536. Do you intend to talk to your partner about contraception in the next three months?
	<i>Please tell me if you strongly agree, somewhat agree, somewhat disagree or don't know.</i>
Belonging	319. It is against your values to have sexual intercourse before marriage.
Belonging	322. Adolescent girls who get pregnant before marriage should feel ashamed.
Belonging	325. Adolescents should have sex before marriage to see if they are suited to each other.
Belonging	411. Condom use means that a person is promiscuous.
Belonging	550. Women who use contraceptives may become promiscuous.
Belonging	544. Use of some contraceptives can make a woman permanently infertile.
Belonging	552. The husband should be the one to decide whether the couple should use a method of contraception.

Belonging	317a. On a scale of 1 – 7 please tell me how having sex makes a person cool. 1 is not cool and 7 is cool.
Belonging	317c. On a scale of 1 – 7 please tell me how having sex makes a person sexy. 1 is not sexy and 7 is sexy.
Belonging	317d. On a scale of 1 – 7 please tell me how having sex makes a person respected. 1 is not respected and 7 is respected.
Belonging	530. Have you and your partner ever discussed the number of children you would like to have?

Table 2. Ability questions that correspond to the Fogg Behavior Model

ABILITY COMPONENT	Questions from survey used in the analysis
	<i>Please tell me if you strongly agree, somewhat agree, somewhat disagree or don't know.</i>
Mental effort	409. Using condoms during sexual intercourse is wise.
Mental effort	410. Using condoms during sexual intercourse is embarrassing.
	<i>Please tell me how easy or difficult it would be to do each of the following.</i>
Mental effort	420. How easy or difficult would it be for you to use condoms with a sexual partner?
Mental effort	421. How easy or difficult would it be for you to discuss condoms with a sexual partner?
Mental effort	422. How easy or difficult would it be for you to discuss condoms with your parents?
Mental effort	565. How easy or difficult is it for you to use contraception?
	<i>Please tell me how confident you would feel, extremely confident, somewhat confident, somewhat uncertain, extremely uncertain or you don't know.</i>
Mental effort	423. How confident are you that you could get a condom if you wanted one?
Mental effort	424. How confident are you that you could have a condom with you when you needed it, that is if you decided to have sex?
Mental effort	425. How confident are you that you could use a condom correctly?
Mental effort	426. Imagine that you are having sex with someone you just met, and you feel it is important to use condoms. How confident are you that you could tell that person you want to use condoms?
Mental effort	427. Imagine that your partner uses birth control pills to prevent pregnancy. You want to use condoms to avoid getting an STD or HIV. How confident are you that you could convince your partner to also use condoms?
Mental effort	563. How confident are you that you could convince your partner to use a method of contraception?
Mental effort	564. How confident are you that you could use a method of contraception even if your partner doesn't want to?
	<i>Now I am going to ask you about the likelihood of some events. Please tell me if you would be extremely unlikely, somewhat unlikely, somewhat likely, extremely likely or don't know.</i>
Mental effort	429. How likely is it that your partner would like it if you had a condom with you?
Mental effort	430. During the next 3 months, how likely is it that you will try to persuade your partner to use condoms every time you have sex?
Mental effort	432. During the next 3 months, how likely is it that you will always have a condom with you?

Mental effort	517. Do you know of a place where you can obtain a method of contraception?
Routine	404. Do you carry condoms with you?

Table 3. Descriptive and Injunctive Norms around Sexual Initiation and Contraceptive Use

NORMS	Questions from survey used in analysis
	<i>Please tell me if you strongly agree, somewhat agree, somewhat disagree or don't know.</i>
Descriptive	329. Most of my friends are having sex before marriage.
Descriptive	331. Most of my friends think female adolescents do not have to maintain their virginity.
Descriptive	557. Most adolescent girls talk to their partners/boyfriends about contraceptives.
Injunctive	330. Most of my friends think it is cool to have sex at my age.
Injunctive	332. Most of my friends think that adolescents who do not have sex before marriage are old-fashioned.
Injunctive	554. A woman who uses contraception without her husband's knowledge should be punished.
Injunctive	556. Most of my friends would approve of my using contraceptives.

Table 4. Frequency distribution and modern contraceptive use by women's characteristics

	(1) Frequency distribution of sample characteristics	(2) Current use of modern contraception	(3) Number of women in the sample
Region			
South	34.1%	34.1%	211
North	65.9%	23.6%**	407
Age			
14-19	26.2%	22.2%	162
20-24	73.4%	28.9%	456
Number of children			
1-3	52.1%	21.4%	322
None	47.9%	33.4%**	296
Marital status			
Married	64.1%	18.9%	396
Boyfriend	35.9%	41.9%***	222
Education			
None or primary	19.4%	20.0%	120
Secondary	66.7%	25.0%	412
Higher than secondary	13.9%	47.7%***	86
Wealth			
Second to fifth quintiles	79.9%	30.2%	494
First quintile/Poorest	20.1%	15.3%**	124
	100%	27.2%	618

*p<0.05 **p<0.01 ***p<0.001

Table 5. Logistic regression showing the adjusted odds of modern contraceptive use among Nigerian women

	Model 1	Model 2	Model 3	Model 4
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Region				
South	1.00	1.00	1.00	1.00
North	0.93 (0.64, 1.33)	1.21 (0.82, 1.79)	1.62* (1.02, 2.58)	1.36 (0.85, 2.16)
Age				
14-19	1.00	1.00	1.00	1.00
20-24	1.68* (1.02,2.75)	1.62 (0.99,2.64)	1.37 (0.84,2.25)	1.23 (0.75,2.02)
Number of children				
1-3	1.00	1.00	1.00	1.00
None	0.87 (0.53,1.44)	0.89 (0.55,1.46)	0.98 (0.58,1.65)	1.01 (0.58,1.78)
Marital status				
Married	1.00	1.00	1.00	1.00
Boyfriend	3.42*** (2.02,5.77)	2.82*** (1.71,4.65)	2.97*** (1.76,4.99)	2.05*(1.17,3.57)
Education				
None or primary	1.00	1.00	1.00	1.00
Secondary	0.79 (0.48,1.31)	0.73 (0.43,1.24)	0.67 (0.40,1.11)	0.61 (0.36,1.02)
Higher than secondary	1.63 (0.79,3.37)	1.49 (0.67,3.32)	1.16 (0.54,2.48)	0.98 (0.44,2.16)
Wealth				
Second to fifth quintiles	1.00	1.00	1.00	1.00
First quintile/Poorest	0.49** (0.29,0.81)	0.51* (0.29,0.89)	0.52* (0.27,0.97)	0.57 (0.31,1.04)
Social norms scale	<i>Not included</i>	0.90*** (0.86,0.95)	0.92** (0.88,0.97)	0.95 (0.90,1.00)
Motivation scale	<i>Not included</i>	<i>Not included</i>	1.07*** (1.05,1.09)	1.05*** (1.02,1.07)

Ability scale	<i>Not included</i>	<i>Not included</i>	<i>Not included</i>	1.06*** (1.03,1.08)
Pseudo R ²	8.59%	11.31%	18.79%	22.21%
Number of women	618	618	618	618

*p<0.05 **p<0.01 ***p<0.001 aOR = Adjusted Odds Ratios; 95%CI = 95% Confidence Interval

Figures

Figure 1

Fogg Behavior Model in the Context of Contraceptive Use

Figure 2

Modern contraceptive use by norms, motivation and ability scores

Supplementary Files

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- [Studyquestionnaire.docx](#)