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Capturing Complexities of Relationship-Level Family Planning Trajectories in Malawi

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Abstract

In a transitioning fertility climate, preferences and decisions surrounding family planning are constantly in flux. Malawi provides an ideal case study of family planning complexities as fertility preferences are flexible, the relationship context is unstable, and childbearing begins early. I use intensive longitudinal data from *Tsogolo la Thanzi*—a research project in Malawi that follows young adults in romantic partnerships through the course of their relationship and allows me to ask two questions: (1) What are the typical patterns of family planning as young adults transition through a relationship? (2) How are family planning trajectories related to individual and relationship-level characteristics? I use sequence analysis to order family planning across time and to contextualize it within each relationship. I generate and cluster the family planning trajectories and find six distinct groups of young adults who engage in family planning in similar ways. I find that family planning is complex, dynamic, and unique to each relationship. I argue that (a) family planning research should use the relationship as the unit of analysis and (b) family planning behaviors and preferences should be sequenced over time for a better understanding of key concepts, such as unmet need.

As countries in sub-Saharan Africa undergo a gradual fertility decline, the dynamics of family planning¹ take center stage (Bongaarts and Casterline 2013). Cross-sectional research indicates that family planning decisions are multifaceted and hinge on cultural scripts, resource availability, and method accessibility (Bongaarts and Watkins 1996; Cleland et al. 2006; Tavory and Swidler 2009). In contexts of uncertainty, women's fertility preferences and behaviors are flexible, dynamic over time, and responsive to social milieus and networks (Entwisle et al. 1996; Sandberg 2006; Sennott and Yeatman 2012; Trinitapoli and Yeatman 2011; Yeatman, Sennott, and Culpepper 2013). Attitudes toward and use of contraception change as relationships shift and evolve (Adetunji 2000; Anglewicz and Clark 2013). Retrospective recall studies find that women often engage in method uptake, switching, and discontinuation throughout their reproductive years (Blanc et al. 2009; Blanc and Rutenber 1991; Blanc and Way 1998). Research also suggests that decisions related to contraception, pregnancy, and childbearing are not stable ones made in isolation. Accordingly, I argue that

¹I use the term family planning throughout to refer to the behaviors, attitudes, and interpersonal interactions related to fertility, as opposed to the term contraception. The term family planning better fits with the non-Western context and acknowledges the relational nature of reproduction (Trinitapoli et al. 2014). I use the term contraception when discussing methods of contraception.

family planning is a dynamic process that involves the navigation of preferences and behaviors within the context of a relationship.

In the developing world, research on family planning discontinuation and switching hints at the complexity of contraceptive use. Many of these studies rely on retrospective recall data and find that the pattern of contraceptive use is linked to a number of factors, such as age and marital status (Blanc et al. 2009; Blanc and Rutenberg 1991; Blanc and Way 1998). Kost (1993) notes complicated patterns of use and finds that women in Peru frequently switch and try new methods of contraception. Ali and Cleland (2010) find that a majority of the women in their study switched methods within three months. In regard to discontinuation, a number of studies find a link between contraceptive abandonment and method failure or unwanted pregnancy (Blanc, Curtis, and Croft 2002; Kost 1993). On the other hand, miscarriages and stillbirths are predictive of contraception uptake (Bledsoe, Banja, and Hill 1998). Callahan and Becker (2012: 220) argue that high levels of discontinuation and switching suggest that “a large proportion of women will have complex reproductive histories.” However, accurately recalling behaviors can be difficult when patterns of contraceptive use are complex (Strickler et al. 1997) and data are collected only at the individual level of analysis.

Conceptualizing family planning at the individual level might miss an important contextual determinant of family planning behavior: the relationship. Romantic relationships provide the backdrop for many family planning decisions. Becker (1996), Dadoo (1998), and others pioneered the inclusion of men in studies of reproductive health, and they point out that both men and women actively participate in family planning decision-making. Studies continue to confirm that men’s family planning preferences matter, finding that men often desire larger families than women (Bankole and Singh 1998) and identifying important cross-couple effects related to symmetries and asymmetries in method change and use (Miller, Severy, and Pasta 2004). Knowledge of men’s preferences is necessary to gain a comprehensive picture of family planning. Thus, relationship-level analyses that focus on the shifts in preferences and behaviors over the course of a relationship have the potential to better capture the complex nature of these decisions.

Modeling family planning at the relationship level further demands an analysis of behaviors over time. It is important to model family planning within a trajectory, since the sequencing of behaviors and attitudes highlights the shifts over the course of a relationship. Family planning trajectories elucidate the contextual meaning of certain family planning concepts, such as unmet need. Unmet need is frequently measured at one point in time, but a cross-sectional approach fails to take into account relationship characteristics or context. A few studies examine unmet need longitudinally and find that unmet need shifts over time and that unintended pregnancies tend to result from persistent unmet need (Casterline, El-Zanaty, and El-Zeini 2003). Westoff and Bankole (1998: 12) argue that their findings in Morocco “underscore the importance of studying unmet need in a longitudinal perspective, which is the only research design that permits evaluating transitions in planning status over time.” Thus, unmet need, in addition to other commonly used family planning concepts (e.g., dual protection), must be contextualized within each relationship and addressed longitudinally.

In the current study, I sequence aspects of family planning (i.e., behavioral, attitudinal, and biological) and generate relationship-level trajectories of family planning. I model these trajectories at young adulthood, a critical stage in the life course. In Malawi, my study context, young adulthood is a period of condensed family planning transitions, including first sex, first marriage, and first birth (National Statistical Office and ICF Macro 2011). To explore the complex and dynamic nature of family planning, I ask two questions: (1) What are the typical patterns of family planning as young adults transition through a relationship? (2) How are family planning trajectories related to relationship characteristics—particularly relationship-level alignment in fertility preferences and family planning intentions and transitions in relationship stage—and demographic characteristics such as age and education?

I address these questions using sequence analysis, an innovative way to reduce a wealth of longitudinal data into understandable and meaningful trajectories. Through the use of intensive longitudinal data, as opposed to recall data, I aim to minimize the occurrence of inconsistent reporting by women with complex family planning behaviors. In so doing, I shift the focus from the individual to the relationship as the unit of analysis and I emphasize the dynamic nature of these behaviors across time.

THE CONTEXT OF MALAWI

While marriage in Malawi is nearly universal, it is a “fragile institution.” One study contends that rates of divorce in the southern region are the highest in sub-Saharan Africa (Reniers 2003). More recently, Grant and Soler-Hampejsek (2014) confirm this finding for a cohort of young adults: almost 60 percent of first marriages end in divorce within five years. Romantic partnerships are the site of negotiations, dialogues, and strategic behaviors aimed at healthier and more manageable futures (Grant and Soler-Hampejsek 2014; Reniers 2008). These high rates of both marriage and divorce point to a relational environment characterized by transition and change.

Young adulthood in Malawi is a time when families form and evolve. Malawians tend to experience first sex at age 17, first marriage at 18, and first birth at 19 (National Statistical Office and ICF Macro 2011). Fertility remains high in Malawi, although some researchers see signs of a slow fertility transition (Bongaarts 2008; National Statistical Office and ICF Macro 2011). Women bear children throughout young adulthood, having a child every three years on average, for a total of 5.5 children per woman (National Statistical Office and ICF Macro 2011; Population Reference Bureau 2014). While fertility decline at the national level is gradual, a number of researchers note that individual-level fertility preferences and behaviors are highly responsive to social and relational uncertainties in young adulthood (Sennott and Yeatman 2012; Trinitapoli and Yeatman 2011; Yeatman et al. 2013).

In Malawi, cultural scripts and interpersonal relations inform decisions related to contraceptive use (Shattuck et al. 2011; Tavory and Swidler 2009), suggesting a strong link between context and contraception. National surveys report that knowledge of contraceptive use for family planning is widespread: 98 percent of women and 99 percent of men report knowledge of modern methods of contraception (National Statistical Office and ICF Macro

2011). However, knowledge does not always lead to use, and rates of use across types of contraceptive method vary greatly. For example, almost 50 percent of women report ever using injectables, while only 18 percent report ever using a male condom (ibid.). This discrepancy between knowledge and use of contraception coupled with a unique relational environment makes Malawi an important case study for examining the connection between the relationship-level context and shifts in family planning behaviors.

DATA AND METHODS

Tsogolo la Thanzi

The intensive longitudinal data for this study come from the research project *Tsogolo la Thanzi* (TLT),² which means “healthy futures” in Chichewa. The goals of TLT are to examine how young adults navigate reproduction, to “develop better understandings of the reproductive goals and behavior of young adults in Malawi,” and to document their transition to adulthood amid the AIDS epidemic (TLT 2014). TLT contains longitudinal data on the fertility intentions and behaviors of romantic partners, making it an ideal dataset for examining patterns of family planning over time. TLT and this study received IRB approval from the home institutions of all principal investigators.

At baseline, female respondents aged 15–25 were randomly selected based on a complete household listing in census enumeration areas within seven kilometers of the district capital, Balaka. This region of Malawi provides the opportunity to examine a wide range of experiences, attitudes, and outcomes, as TLT samples respondents from both the peri-urban town center and the surrounding rural villages. A randomly selected sample of 1,505 women were interviewed at wave one and then followed at four-month intervals between 2009 and 2012 (eight waves). TLT had an initial response rate of 96 percent at baseline. Trained interviewers obtained informed consent from female and male respondents at the time of recruitment into the study. Interviews were conducted in private rooms at TLT’s centrally located research center, providing a safe and confidential location for respondents to discuss their sexual and romantic partnerships with Malawian interviewers.

The current study is a secondary analysis of the TLT dataset, which includes relationship-level data. At each of the eight waves, female respondents were asked to report on their sexual and romantic partners. For each romantic partner they reported in their interview, female respondents were given a token and asked to recruit the male partner for the study (Conroy 2014; Yeatman and Sennott 2014). The male partners brought these tokens to the TLT research center, enrolled in the study, and completed a full interview at that wave and each subsequent wave. Staff at the TLT center matched the female respondent with her male partner to create the unique relationship-level dataset used here. This method of partner recruitment generated a dataset of 792 relationships that contribute 6,324 relationship-waves (defined as the number of study waves contributed by the relationships).

²More information on the project is available at <http://sites.psu.edu/tltc/>. Persons interested in obtaining TLT data files should visit the website at: <http://tsogolathanzi.uchicago.edu/>.

A number of points are relevant to this sample of relationships. Because women could recruit their partner at any wave of the study, some men entered the study at later waves, and some relationships ended before the study was complete. Similarly, although many partners entered the study at wave one, this is not necessarily the baseline of their relationship, and we may be observing the relationship at a later stage. Women were allowed to report more than one partner, either concurrently or subsequently; approximately 8 percent of women are linked to more than one partner during the observational period.

Sequence Analysis

To answer my first research question, I generated and visualized family planning trajectories at the relationship level, uncovered dominant patterns, and clustered on these similarities. To address my second research question I determined which individual and relationship attributes characterize the groups of trajectories. Traditional longitudinal methods are inadequate for this study as my research questions are not causal in nature nor am I predicting a specific event; therefore, I used sequence analysis (SA) to inductively uncover the complex story of family planning. SA is ideal for the intensive longitudinal data I use here, as it allows me to reduce many data points and to sequence family planning behaviors and attitudes at four-month intervals. I used the tools of SA to generate, visualize, and group family planning trajectories and identify their relationship-level and sociodemographic correlates.

My analysis consists of five steps: (1) element variable creation, (2) sequencing and description, (3) visualization, (4) comparison, and (5) clustering (Brzinsky-Fay, Kohler, and Luniak 2006). First, I create the element variable by identifying six mutually exclusive states of family planning based on women's reports of contraceptive use. The element variable is the foundation of sequence analysis and I describe it in more detail below. Second, I sequence family planning states for all 792 couples over the course of their relationships, creating what I call family planning trajectories. I describe the dominant states and patterns across the trajectories. Third, I visualize the family planning trajectories using sequence index plots (i.e., the graphical representation of these trajectories). In a sequence index plot, the y-axis stacks each relationship and identifies them by an ID number. The x-axis displays the wave of the study, indicating time. The visualization of the trajectories reduces a multitude of longitudinal data points to one specific image, providing clarity and ease of comprehension. Fourth, I use optimal matching, a technique to measure the distance between sequences based on the weighted number of insertions, deletions, and substitutions of a state in order to make one trajectory look like another. The output of optimal matching is a dissimilarity matrix. Finally, I use this dissimilarity matrix to cluster the trajectories using Ward's hierarchical clustering. I use substantive meaning and theoretical guidance to name and analyze the six clusters identified in this study.

The Element Variable

I use sequence analysis to model trajectories based on transitions into and out of a defined set of states, which comprise the element variable. My element variable consists of family planning states that factor in contraceptive use behaviors, the biological state of pregnancy, and preferences about childbearing. I derive these six states from women's reports, but they

are specific to each relationship, as I use reports only from women who are matched with a partner in the study. In line with the proximate determinants framework, I rely on women's reports of contraceptive use (Bongaarts 1978). Men's reports have been shown to under- or overestimate contraceptive use. Men may unknowingly underreport contraceptive use, as some of their partners use contraception covertly (Biddlecom and Fapohunda 1998; Watkins, Rutenberg, and Wilkinson 1997). On the other hand, a study in southern Malawi suggests that men may over-report contraceptive use to show their support for political leaders or NGOs that encourage family planning behaviors (Miller, Watkins, and Zulu 2001).

The first two states capture contraceptive nonuse but differentiate according to stated fertility intentions. *Unmet need* refers to women who report not using any contraception and who do not want another child within the next two years. *No need* refers to women who are not using contraception and want another child in the next two years or sooner. The next three states relate to *met need*. The *met need (condoms only (CO))* state refers to women who report having used condoms at least once during their last three instances of sexual intercourse but are not using another form of contraception. *Met need (hormonal only (HO))* refers to women using hormonal contraception and not using condoms. I label this category as hormonal only because the vast majority (88 percent) of non-condom contraception users in this study use injectables. Only around 5 percent of women report using the pill and less than 2 percent report using each of the remaining methods (i.e., calendar methods, IUD, sterilization, and traditional medicine). Women who are using condoms and hormonal contraception simultaneously with a given partner fall into the *met need (condoms and hormonal (DUAL))* state. I treat *pregnancy* as its own state, classified by pregnancy biomarker data.³

Descriptive Variables

I examine a number of variables that describe the woman and the relationship. In the main descriptive statistics table, Table 3, I report the mean or proportion at baseline for variables that I treat as time-invariant. Variables marked by an asterisk vary across the relationship and are reported as a proportion of relationship waves or mean value across all relationship waves. I first describe the woman-level variables included in this analysis. In regard to sociodemographic characteristics, I look at age, education, rurality, and status. Women's age ranges from 15 to 25 years ($\bar{x} = 20.5$) and years of education range from 0 to 14 ($\bar{x} = 7.2$). I include a measure of the normed distance (in kilometers) from the town center, which proxies as a measure of rurality, with greater values indicating residence in a more rural village. As an indicator of status, I include a measure that indicates the percent of women who have an iron or cement roof, as these roofs tend to be more expensive and viewed as modern. I examine a number of variables related to fertility preferences and behaviors. To address a woman's attitude toward pregnancy, I use a variable that asks, "If you found out you were pregnant next month, would that news be: Very bad, fairly bad, neither good nor bad, fairly good, or very good?" Responses range from 1 (very bad) to 5 (very good). I include a measure of a woman's ideal family size. Non-numeric and "don't know" responses

³At each wave of TLT, women were offered a pregnancy test post-interview and were given the results of the test. The biomarker data allow for a more accurate representation of pregnancy at any given wave, as women who do not know they are pregnant would be missed in self-reports.

make up only 1 percent of responses and are coded as missing. I calculate a pregnancy rate that reports the average number of pregnancies per 100 women. Because parenthood may alter family planning behaviors and intentions, I include a measure indicating the percent of relationships in which the woman entered the study with at least one child.

In addition to the above variables, I include a number of relationship-level variables. I include relationship-level measures of the difference in age and education. To measure dissimilarity in fertility attitudes and expectations, I include a measure that identifies the percent of relationship waves with a two or more unit difference between the two partners in scores on the pregnancy variable (described above). Additionally, I report the percent of relationship waves in which there is a two or more child difference in men's and women's ideal family size. I measure relationship status in four ways. First, I include the percent of relationships in which the partners experience a relationship status change during the course of the study (e.g., changing from infrequent partner to steady boyfriend/girlfriend). Second, I report the percent of relationships that enter the study with a duration of one or more years. Third, I provide information on the percent of relationship waves spent in a specific relationship status (i.e., married, cohabiting, steady boyfriend/girlfriend, new boyfriend/girlfriend, or infrequent partner). Lastly, I identify the percent of partners who entered the study already married and the percent who marry during the study.

RESULTS

The distribution of family planning states across all waves is shown in Table 1. The met need (DUAL) state is the smallest, with at most only 3 percent of relationship waves spent in this state, suggesting that very few couples consistently use dual protection. The second smallest group is met need (CO). At any given wave, less than 10 percent of relationship waves are identified as using condoms only. More than a third of relationship waves are spent in the met need (HO) state. Around 12 percent are identified as in the no need state: couples who want a child in the near future and are not using contraception. About 20 percent of waves are spent pregnant, and this proportion decreases over time.

An intriguing observation from Table 1 is that the proportion of relationships within each state remains relatively consistent across the eight waves. This could suggest two things: (1) couples are consistent in their family planning; and/or (2) couples are moving in and out of different states of family planning over the course of their relationship, which results in fairly constant proportions at any given wave. I use sequence analysis to further explore these patterns within the context of each relationship.

Sequence Analysis

In this study, I find that very few of the observed relationships have identical family planning trajectories. Only about 5 percent of family planning trajectories are shared by two relationships, and around 2 percent are shared by three relationships. One should note that comparisons across trajectories take into account both the states of family planning and the length of the trajectory. Similarly, within relationships, I find highly inconsistent family planning behaviors. Some 70 percent of relationship trajectories exhibit inconsistent states (see Table 2), meaning that the partners shift between different family planning behaviors

and intentions throughout their relationship. Only one in six relationships remains in a single state of family planning for the duration of the study. As shown in Table 2, the most stable family planning state is met need (HO), with around 8 percent of relationships consistently in this state. Around 13 percent of relationships contribute only one wave to the study.

Family planning is largely relationship-based rather than woman-based. To show the variation in trajectories across women *and* relationships, I plot family planning states by wave for three particular women (see Figure 1).⁴ The first partnership, Relationship 1, lasts throughout all eight waves of the study. This family planning trajectory exhibits multiple transitions in family planning states over time. Relationship 2 exhibits consistent family planning behaviors throughout its duration; the relationship ends in wave 6, but up until that point the woman uses hormonal contraception at each wave.

In Figure 1 the same woman is the female partner in relationship 3 and relationship 4. She is in a partnership with a man in waves 3 and 4, but their relationship ends and she enters into another partnership at wave 5 with a different male partner. In her first partnership, she uses hormonal contraception consistently. She begins her next partnership in a state of unmet need. At wave 6, she reports condom use, yet at wave 7 the woman tests positive for pregnancy. Patterns of family planning behavior are dependent on both the relationship and the individuals who make up the couple, with this woman showing very different behaviors in her two partnerships.

The sequence analysis conveys two points: (1) very few relationships exhibit similar family planning behaviors, with less than 10 percent of couples exhibiting the same sequence of family planning as another couple in the study; and (2) couples exhibit a great deal of complexity in their family planning behaviors across the duration of their relationship, with five out of six relationships exhibiting inconsistent family planning behaviors across their contributed waves. Next, I turn to cluster analysis to uncover subgroups of young adults who do show similar family planning trajectories.

Cluster Analysis

Using cluster analysis, I identify six distinct groups containing couples with similar family planning trajectories. First, I name each cluster according to its predominant family planning states and relationship characteristics. I name the first cluster *Childbearing Consistent Users* based on its relatively high hormonal contraceptive use and high rate of pregnancy. Table 3 shows that this cluster exhibits the second-highest level of met need (HO), with 53 percent of their relationship waves spent using hormonal contraception; however, this cluster also exhibits the highest rate of pregnancy (34 pregnancies per 100 women). The *Married Spacing* cluster consists mainly of married couples (99 percent of relationship waves spent married) who spend a majority of their waves in the met need (HO) state. These relationships have, on average, the highest parity (1.76 children), an ideal family size of 3.55 children, and a below-average score on the pregnancy attitude variable suggesting that these couples are using hormonal contraception to space their births. The *Transitory* cluster is notable in that the relationships are short-lived and couples use a temporary form of

⁴Figures are available at the supporting information tab at wileyonlinelibrary.com/journal/sfp.

contraception (i.e., condoms) in over a third of the relationship waves. Relationships in the *Transitory* cluster contribute, on average, the shortest number of waves (2.68) and many of these relationships are temporary dating partnerships.

The cluster with the highest proportion of relationship waves spent in the no need state and the highest score on the pregnancy attitude variable, coupled with a relatively low pregnancy rate, is the *Pursuing Conception* cluster. This cluster is the smallest of the six, containing only 5 percent of the relationships. The *Persistent Unmet Need* cluster has the highest levels of unmet need and pregnancy. Table 3 shows that 39 percent of relationship waves in the *Persistent Unmet Need* cluster are spent in the unmet need state; this cluster has the highest pregnancy rate (18 pregnancies per 100 women) and 28 percent of relationship-waves are spent pregnant. Finally, the *In Transition* cluster is the largest, containing over a quarter of the relationships. These relationships transition through many family planning states. While the unmet need state and the state of pregnancy are the most common, this cluster is markedly different from the *Persistent Unmet Need* cluster as more than a third of the relationship waves in the *In Transition* cluster are identified as unmarried (i.e., dating or infrequent partner). Most importantly, 60 percent of couples in the *In Transition* cluster experience at least one relationship status change during their time in the study. These couples transition through both family planning states and relationship statuses.

The plots in Figure 2 are visual representations of the trajectories contained in each of the six clusters.⁵ The plots display both the prominent family planning states and the ordering of the states across each relationship. Many of the trajectories in the *Childbearing Consistent Users* cluster exhibit pregnancy followed by met need (HO). The *Married Spacing* cluster is dominated by the met need (HO) state. The trajectories in the *Transitory* cluster are overwhelmed by white space, indicating short relationship duration. The sequence index plot shows that the *Pursuing Conception* cluster is clearly the smallest and the bulk of the relationships are spent in the no need state. The *Persistent Unmet Need* cluster exhibits a good deal of pregnancy surrounded by unmet need. The *In Transition* cluster contains relationships characterized by many shifts in contraceptive use, as can be seen from the variation in color in the sequence index plot for this cluster.

The cluster visualizations in Figure 2, combined with the descriptive statistics in Table 3, elucidate two more general findings discussed next. First, relationship characteristics matter. The clusters tend to form around marriage and family formation, despite the fact that clustering is based solely on family planning states, which do not take relationship status into account. Four of the six clusters consist mainly of couples who entered the study already married (see Figure 3). These first four clusters in the figure represent four general patterns of family planning for married couples. They do not vary greatly in relationship status, but they are defined by their predominant family planning states and fertility situations. Figure 3 also shows that less than half of the remaining two clusters consist of couples who began the study already married. Many of these couples are in the early stages of dating and are not engaging in consistent family planning behaviors as they have not yet

⁵Appendix Figures A1–A6 show sequence index plots for individual clusters. Appendix is available at the supporting information tab at wileyonlinelibrary.com/journal/sfp.

transitioned into marriage or family formation. These two clusters experience more relationship transitions; they also consist of many dating relationships that do not move into marriage during the study period.

The *Transitory* and *In Transition* clusters also show the highest prevalence of dissimilarity in fertility preferences. In both clusters, as reported in Table 3, the partners exhibit a 2+ unit difference in the pregnancy variable in over 80 percent of the relationship waves and a 2+ child difference in ideal family size in about 70 percent of waves. The amount of disagreement on fertility intentions is well above the mean for all relationships in the study and much higher than the other clusters. Yet, these two clusters consist of relationships between relatively young, peri-urban, and higher status partners. On the other hand, the couples in the *Married Spacing* cluster and the *Pursuing Conception* cluster are more similar to each other in their fertility intentions. Table 3 indicates that couples in these clusters experience differences in ideal family size in only a quarter of the relationship waves, and less than half of the relationship waves are characterized by a difference in pregnancy attitudes between partners. The *Married Spacing* and *Pursuing Conception* clusters, however, exhibit a larger age difference and lower levels of education than the *Transitory* and *In Transition* clusters.

Second, sequence matters. In other words, the definition of the family planning state depends on its position relative to other states, which determines how family planning behaviors or outcomes operate within the relationship. For example, looking at the state of unmet need using sequence analysis, one can identify which states precede or follow it. In the *Childbearing Consistent Users* cluster, much of the unmet need follows a pregnancy and may thus be due to lactational amenorrhea in combination with wanting to postpone the next pregnancy. In the *Married Spacing* cluster, 13 percent of relationship waves are spent in the state of unmet need; though, by ordering these states within each relationship, we see that many couples in this cluster regularly use hormonal contraception and the state of unmet need is merely interspersed throughout their trajectories. However, I do identify a cluster of relationships that is experiencing persistent unmet need. Looking across the waves contributed by these relationships, rather than at one point in time, one can see that over a third of the waves in the *Persistent Unmet Need* cluster are spent in the state of unmet need. These couples also experience a high rate of pregnancy. This cluster exhibits characteristics that previous researchers have found to be associated with unmet need—in particular, rural residence, poverty, and low levels of education (see Table 3)—suggesting that these couples may be underserved or lack adequate knowledge of where to obtain contraception or how to use certain methods. One out of every six relationships in my study is classified in the *Persistent Unmet Need* cluster.

Study Limitations

These findings are informative for research and policy, although the current study has limitations. First, the sequence analysis does not allow for a causal explanation of these family planning behaviors, nor should it be misinterpreted in a causal framework. The contribution of this study lies largely in its descriptive and exploratory finding that family planning behaviors are relationship-specific and dynamic over time. This point can easily

become lost in statistical models that treat family planning as an individual-level event to be predicted. Second, while the importance of looking at family planning at the relationship level is undisputed, the actual process of doing so is complex. In this study I use relationship data to follow couples across time and address a number of couple-level discrepancies; however, my use of women's reports of contraceptive use has its limitations. Future projects should further explore the issue of discrepant reports of contraceptive use and reciprocal transitions in fertility preferences between partners over time. On the other hand, the findings from this study, though relying on women's reports of contraceptive use, restrict the trajectory to the duration of the relationship and include intentions and attributes of the male partner, setting a precedent for future studies to do the same when data allow. Third, data constraints limit my analysis to young adults. While this life stage is a critical one in Malawi, characterized by life transitions associated with family planning behaviors, I lack data on women's behaviors below age 15 and over age 29. Given the age range captured in the data, I may be missing higher-order births; however, I make this tradeoff in order to capture the transition into and the early stages of childbearing. In contexts where childbearing begins later, researchers would be wise to expand the age range to include women in later adulthood.

DISCUSSION

I provide a comprehensive picture of the experience of family planning in Malawi by modeling three aspects of family planning (i.e., intentions, contraceptive use, and pregnancy) within the context of relationships. These findings extend beyond the Malawian context, in the form of two generalizable conclusions: (1) family planning research should go beyond the individual and concentrate on the relationship as the unit of analysis, and (2) family planning is complex and dynamic and research that fails to conceptualize it as such might misinterpret findings by portraying family planning behaviors as more stable than they are in reality. I use sequence analysis to reduce rich longitudinal and relationship-level data into clear trajectories. My findings align with Hayford (2009), who models the change in trajectories of fertility expectations across the life course; relatedly, I find support for shifts in fertility preferences and behaviors over the course of a relationship. I visualize family planning trajectories in response to the appeal for more and better data visualization in the social sciences (Healy and Moody 2014). These visualizations serve to more clearly communicate the complexities inherent in family planning.

Throughout the course of a relationship, family planning behaviors and intentions may shift, sometimes dramatically. The level of consistency in family planning is associated with relationship-level characteristics, such as status, duration, and dissimilarity. In the two clusters containing short-lived, dating relationships, family planning behaviors and intentions are largely unstable. The *In Transition* cluster shows many transitions between relationship statuses and through various family planning states; relationships in the *Transitory* cluster are short-lived and have high rates of temporary contraceptive use (i.e., condoms). On the other hand, three out of the four clusters characterized by marital partnerships (*Married Spacing*, *Childbearing Consistent Users*, and *Pursuing Conception*) exhibit relative consistency in family planning behaviors. In some instances, then, relationship status could be understood as a classification mechanism for family planning

trajectories. Yet I uncover an important outlier to the binary married–consistent and unmarried–inconsistent divide: the *Persistent Unmet Need* cluster. This cluster is highly inconsistent in its family planning intentions, behaviors, and outcomes; however, the majority of the relationships are marital partnerships. In sum, this study finds that relationship status aligns with certain family planning behaviors for some couples, but other relationship characteristics, such as sociodemographic identifiers and differences in fertility intentions, better explain the experiences of other couples. Overall, relationship-level attributes are informative and necessary for understanding consistency in family planning behaviors.

The sequencing, or ordering, of family planning behaviors and intentions provides further insight into the complexity of unmet need. Classifying an individual as experiencing unmet need in a cross-sectional analysis may be problematic. In a number of the trajectories identified in my longitudinal analysis, the partners shift into and out of the state of unmet need. For some of these relationships, unmet need results in a pregnancy; for others, it exists within a broader trajectory of relatively consistent contraceptive use. Some of these couples may indeed be experiencing unmet need—perhaps they are unable to make it to the clinic for their injectable that month—but the experience of unmet need for someone who uses contraception most of the time (e.g., the *Married Spacing* cluster) might mean something completely different than it does for a couple who do not consistently use any form of contraception (e.g., the *Persistent Unmet Need* cluster). The couples in the *Persistent Unmet Need* cluster exhibit a complex combination of unmet need, pregnancy, and socioeconomic disadvantage that I identify as pervasive unmet need. Almost a sixth of the relationships studied here are classified in the *Persistent Unmet Need* cluster. This means that a sizable portion of young adult couples in Malawi, many of whom are married, experience persistent unmet need. I therefore identify a possible problem with classifying unmet need in a cross-sectional framework: measuring unmet need at a single point in time may artificially inflate its incidence. In both developing and developed countries, unmet need is an important indicator of the success of family planning programs. Researchers should sequence unmet need within the context of a relationship to expose the complex and dynamic components of unmet need and ensure an accurate definition of the concept. A more comprehensive understanding of unmet need as a relationship characteristic, rather than an individual-level one, is more meaningful for research agendas and policy outcomes related to unmet need.

The findings concerning condom use and dual protection speak directly to policy. In the sub-Saharan Africa context, condom use and dual protection enter the policy discussion in two key ways. First, many NGOs and government policies abide by the ABCs of HIV prevention—the “C” in which encourages condom use (Trinitapoli 2009). Second, research and policy endorse dual protection: the concept of the condom as a dual-protector against both HIV and pregnancy, or using two methods of contraception (i.e., a barrier and a hormonal method) to obtain dual protection from HIV and pregnancy (Maharaj 2006). I do not find, in the context of Malawi, that use of condoms or dual protection is widespread. This observation is consistent with research on condom use in Malawi, which finds that condoms are perceived as risky, indicative of mistrust, and sexually unsatisfying (Tavory and Swidler 2009) and lends support to the idea of the condom as “an ‘intruder’ in marriage” (Chimbiri 2007). In the current project, dual protection is very rare across all six clusters. Condom use, the

second most infrequent family planning state, is almost non-existent in the clusters characterized by marital partnerships and occurs most frequently in the *Transitory* cluster. Condom use, in such a context, is transitory. By this I mean that condom use is not a permanent tool that couples turn to for family planning; rather it is a transient solution employed in short-term relationships. If condom use were particularly sensitive to specific attitudinal or behavioral changes in relationships, one would expect clearer patterns of fluctuation in its use. This is not the case. It appears that a specific type of relationship facilitates consistent condom use and that these relationships are not the norm. The finding that condom use is patterned by relationship type and is unstable within relationships serves as a reminder to policymakers and practitioners to focus on the relationship as the backdrop to family planning decisions. Future research should use sequence analysis to better understand the patterning of short-acting (e.g., condoms) versus long-acting (e.g., injectables) contraception across various relationship types.

In conclusion, family planning is a dynamic process that manifests at the relationship level and transitions over time as young adults in Malawi navigate these decisions within a fertility climate characterized by shifting attitudes, goals, and behaviors. I identify a typology of family planning that captures both its complexity and its relational characteristics. These substantive and methodological contributions are applicable beyond the particular context of Malawi, given that partners navigate family planning in low-fertility contexts as well. In contexts of below-replacement fertility, the sequencing of family planning behaviors and fertility intentions throughout the course of a relationship can provide meaningful insight into the downward revision of fertility intentions and unwanted higher-order births (Morgan and Taylor 2006). In high-fertility contexts, policy and community groups should focus on subpopulations of young adults, beginning with the ones I identify here, and use relationship characteristics to classify family planning needs and outcomes. In every context, more resources should be allocated to research, policies, and programs that pay attention both to partners' intentions and to characteristics of the relationship, as these shape patterns of family planning over time.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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APPENDIX. Individual Sequence Index Plots for the Six Clusters

Figure A.1.
Childbearing Consistent Users

Figure A.2.
Married Spacing

Figure A.3.
Transitory

Figure A.4.
Pursuing Conception

Figure A.5.
Persistent Unmet Need

Figure A.6.
In Transition

TABLE 1

Family planning state by wave, percent of relationships at each wave

	Wave (%)							
	1	2	3	4	5	6	7	8
Unmet need	24.7	24.3	25.2	24.4	22.3	22.6	23.4	28.9
No need	12.1	14.6	10.1	10.6	11.2	10.9	10.8	10.1
Met need (condoms only)	6.0	8.6	7.7	7.2	8.3	7.8	7.1	6.8
Met need (hormonal only)	33.9	32.0	35.4	35.4	38.1	40.2	40.5	40.8
Met need (dual)	0.9	1.7	2.9	2.1	2.1	1.6	1.3	0.7
Pregnant	22.4	18.9	18.8	20.3	18.1	16.9	16.9	12.8
N	403	521	577	587	585	629	603	616

TABLE 2

Consistency in family planning states

	Percent of relationships	N	Average number of waves contributed by these relationships	Range of waves contributed by these relationships	Min	Max
Inconsistent family planning states	71.3	577		6.0	2	8
Consistent family planning states	16.1	115		4.0	2	8
<i>Unmet need</i>	1.9	14		2.9	2	6
<i>No need</i>	1.9	13		3.4	2	8
<i>Met need (condoms only)</i>	2.7	20		3.5	2	8
<i>Met need (hormonal only)</i>	7.8	55		5.1	2	8
<i>Met need (dual)</i>	0.3	2		2.0	2	2
<i>Pregnant</i>	1.4	11		2.1	2	3
Contribute 1 wave only	12.6	100		1.0	1	1
N	100.0	792				

TABLE 3
Descriptive statistics by cluster, means/proportion at baseline, (asterisk=proportion/mean of relationship waves)

	Clusters					All relationships	
	Childbearing consistent users	Married spacing	Transitory	Pursuing conception	Persistent unmet need	In transition	
Family planning states							
Unmet need*	0.17	0.13	0.25	0.19	0.39	0.31	0.25
No need*	0.05	0.03	0.06	0.64	0.09	0.13	0.11
Met need (condoms only)*	0.02	0.01	0.36	0.01	0.07	0.10	0.07
Met need (hormonal only)*	0.53	0.73	0.21	0.05	0.17	0.21	0.37
Met need (dual)*	0.02	0.01	0.05	0.01	0.01	0.02	0.02
Pregnant*	0.21	0.09	0.07	0.11	0.28	0.23	0.18
Fertility							
Pregnancy rate (per 100 women)	34	13.1	3.9	7.3	18.1	14.8	16.3
Pregnancy attitude: If found out pregnant - very bad (1)–very good (5)*	1.60	1.80	1.59	4.14	1.95	2.05	2.21
2+ unit difference between partners on pregnancy attitude variable*	0.51	0.44	0.81	0.45	0.59	0.82	0.60
Female's ideal family size*	3.60	3.55	3.31	3.61	3.63	3.26	3.42
2+ child difference between partners in ideal family size*	0.32	0.23	0.73	0.25	0.36	0.69	0.42
Woman has at least one child at baseline	0.69	0.96	0.54	0.66	0.71	0.43	0.59
Parity*	1.11	1.76	0.86	1.00	1.02	0.65	1.00
Relationship status							
Experienced at least one relationship status change	0.14	0.05	0.28	0.07	0.12	0.61	0.14
Relationship duration more than 1 year at baseline	0.72	0.90	0.66	0.85	0.80	0.54	0.67
Married/cohabiting*	0.96	0.99	0.54	0.95	0.92	0.63	0.83
Steady boyfriend/girlfriend*	0.03	0.01	0.39	0.05	0.08	0.32	0.15
New boyfriend/girlfriend*	0.00	0.00	0.02	0.00	0.00	0.02	0.01
Infrequent partner*	0.01	0.00	0.05	0.00	0.00	0.03	0.01

	Clusters						All relationships	
	Childbearing consistent users	Married spacing	Transitory	Pursuing conception	Persistent unmet need	In transition		
Average number of waves contributed per relationship	6.88	7.52	2.68	7.19	6.85	3.00		5.10
General demographics								
Distance from research center (normed kilometers)	0.34	0.07	-0.05	0.14	0.36	-0.01		0.12
Roof has iron sheets or cement	0.32	0.44	0.81	0.63	0.36	0.77		0.65
Woman's years of education	6.70	6.70	7.96	6.87	6.41	7.25		7.19
Education difference (man's minus woman's)	1.47	1.51	0.90	1.53	1.06	1.63		1.38
Woman's age	20.69	21.78	20.37	21.68	20.68	20.36		20.50
Age difference (man's minus woman's)	5.66	5.57	4.84	6.74	4.71	3.98		4.80
N (relationship waves)	800	1096	1224	328	1104	1772		6324
N(relationships)	100	137	153	41	138	223		792
Proportion of total	0.13	0.17	0.19	0.05	0.17	0.28		1.00