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Espericueta, Luisa

Publication Date

2021

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UNIVERSITY OF CALIFORNIA

Los Angeles

Effects of Cultural Mismatch on the Age at First Reproduction in Hispanic Women and the
Cooperative Help Received from Grandmothers-to-Be

A Master's Thesis submitted in partial satisfaction of the requirements

for the degree Master of Science in Biology

by

Luisa Espericueta

2021

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ABSTRACT OF THE MASTER'S THESIS

Effects of Cultural Mismatch on the Age at First Reproduction in Hispanic Women and the Cooperative Help Received from Grandmothers-to-Be

by

Luisa Espericueta

Master of Science in Biology

University of California Los Angeles, 2021

Professor Pamela Yeh, Chair

Cultural values, such as *machismo* and *marianismo*, and its effects on women sexuality and reproduction have been well documented across studies. However, little is known about the effects of *respeto* and *familismo* on the age at first reproduction in Hispanic women. Additionally, the transition into new environments (i.e., migration into the United States) oftentimes place women in conflicting situations due to differences in their outside cultural environment versus their home environment which may likely result in cultural mismatches. The present study investigates the effects of cultural values and acculturation on the age at first reproduction in 114 Hispanic women in the U.S.. Including how the transition of Hispanic women into the U.S. may result in a cultural mismatch affecting their reproductive decisions and thus the rate of cooperative care they may later receive from the grandmother-to-be when conceiving and postpartum. Cultural values and acculturation did not significantly impact age at first reproduction in this cohort of women. While cooperative help from grandmothers-to-be appeared to be associated with younger age at first birth (>20), however, the model itself was not statistically significant.

The thesis of Luisa Espericueta is approved.

Daniel T. Blumstein

Molly Fox

Pamela Yeh, Committee Chair

University of California Los Angeles

2021

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INTRODUCTION

Evolutionary mismatch is a phenomenon that occurs when a trait that has evolved in a previous era of human history as beneficial in one environment is no longer adaptive (maladaptive) in another environment [1]. It is a state of disequilibrium of traits that were once adaptive. Evolutionary mismatch is divided into two types: genetic mismatch and cultural mismatch [1-2]. Although previous studies have predominantly focused on genetic mismatch, cultural mismatch is also imperative as it provides explanations, and perhaps even solutions, to genetic mismatches. Genetic mismatch can be defined as: a set of genes or traits that were once adaptive in a previous environment that has become maladaptive due to changes in the current environment. It is a discordance between the genetic makeup of an individual/s and their current environment [1, 3]. Whilst cultural mismatch can be defined as: “a once advantageous culturally transmitted practice, custom, meme, idea, belief, or belief system that has become detrimental due to environmental change [2, p.1].” This phenomenon is exacerbated in the modern world due to rapid and constant changes in our environment and cultural evolution, which has the potential to occur much faster than our genes can evolve [1]. To understand why cultural mismatches occur, in the context of changing environments, it is important to understand the importance of culture and its influence on human behaviors. Including, the negative effects resulting from two opposing cultures come into contact with one another due to human migration.

Culture is a strong force influencing human evolution. Human culture encompasses certain ideas and behaviors, including artifacts, from a group of individuals, or nation, that can be learned and transmitted, and of which have the potential to change over time [4]. Culture and cultural evolution have facilitated and provided the main basis for which human ancestors have adapted to their environment and oftentimes provides an explanation for human genetic evolution [4]. For instance, culture facilitated human adaptiveness to cold weathers which we would have otherwise not sustained through the practice of clothing and has resulted in the evolution of lactose persistence in adult humans as a result of milk consumption past our weaning phase via the cultural practice of cattle domestication and dairying [4]. This enabled the production of lactose enzymes via a genetic mutation which was strongly favored by selection [4]. Whilst, cultural values, a component of culture, reflect the certain and specific ideas which shape behaviors within a specific culture. Cultural values have provided a basis as to how individuals should behave and has facilitated the unification of groups of individuals, which is likely to be necessary for community-based support in times of assistance (i.e., during child rearing) [5-7].

Culture, specifically cultural values, continue to affect human evolution and biology in immediate forms today. The process in which social and cultural environments affect human population biology is quite evident in Hispanic culture, such as cultural values shaping sexual behaviors and influencing the age at first sexual encounter [8-9], and thus the age at first birth and the maximum number of children women can have throughout their lifespan.

In Hispanic cultures, women are subjected to gender inequality as women essentially lack control over their bodies and sexual and reproductive health [9-10]. Traditional Hispanic cultural values that influence women sexual behaviors and of which establish a sexually restricted environment include *machismo* and *marianismo*, *familism*, [8] and *respeto*. *Machismo* refers to gender role socialization, and emphasizes family responsibility, including hard work, and honor for men,

including sexism [11]. *Marianismo* refers to a woman's role in Hispanic culture, such as to be pure, compliant, and readily available to provide moral strength to the family [11]. *Familismo* refers to cultural values which stress the importance of family life, in which family members are closely tied by sentiments of respect, loyalty, and unity [11]. *Respecto* emphasizes an individual's respect for their elders, clergy, and authority [11]. Because of the immense influence of cultural value on women's reproductive health, cultural norms often play a prominent role on age at first birth in Hispanic culture and greatly influence population biology.

Gender role norms, such as *marianismo* and *machismo* predominately influence sexual values and affect sexual behaviors amongst the Hispanic community [12-13]. Marianismo norms suggest that women should maintain their virginity until marriage and should not engage in any sexual act prior to their wedding day. It is associated with later initiation of sexual intercourse though, ironically, lack of contraceptive use [12-16]. Whilst machismo has been associated with unprotected sexual behaviors in men, and the power to decide sexual behaviors and contraceptive use [12-15].

Although the effects of *machismo* and *marianismo* on early sexual activity has been well documented across numerous studies, the effects of *familismo* and *respecto* have been understudied as a factor impacting sexual behavior in Hispanic youth.

Familismo is a significant factor in preventing early sexual activity as it is often associated with sexual decision-making among Hispanic culture. *Familismo* encourages interdependent relationships in a family system, and its values interconnectedness between immediate and extended family members [16-17]. This often results in family members often feeling inclined to express opinions about when it is the most appropriate time for younger family members to participate in sexual activity, and whom an individual should become sexually involved with. In families with strong *familismo* ties, Hispanic youth often express responsibility and obligations towards their family members resulting in inability to independently make decisions pertaining to their own sexual life. *Familismo* predominately influences sexual behaviors in women as it encourages women to behave in public in ways that are thought to maintain family honor. This suggests that *familismo* constructs are more predictive of sexual risk taking for adolescent girls than for adolescent boys [15-18].

Respecto emphasizes the importance of respect and means that an individual is expected to defer to those in positions of higher power and/or those of greater age. In Hispanic families, due to the cultural concept of *respecto*, children are often reluctant to question or argue with elders about the importance of postponing sexual activity, as this would signify a lack of respect, and are more likely to participate in more sexual risk behaviors due to an uncomfortable environment set by cultural values which prevent a safe space to converse about safe sex [19]. *Respecto* is also often extended to mean respect for a woman's body. For instance, maintaining purity until marriage and refraining from sexual activities with other men, other than your husband, signifies respect for your body, as a woman, and is believed to be an important factor in determining male respect towards women.

In Hispanic communities, cultural values have been collectively utilized as scare tactics to pressure women, or young teenagers, to avoid pregnancies and keep women "innocent" [15, 20-

21]. Although these values do not always produce the most ideal outcomes when considering maximized individual fitness, Hispanic culture and cultural values continue to persist due to its positive influence on human adaptiveness to their environment and the social support that accompanies adherence to culture from social groups. Still, despite the fact that cultural values have been noted as a significant factor in preventing early Hispanic women sexual and reproductive behaviors, high birth rates among Hispanic teenagers in the United States have generated an increased interest in the role of acculturation in women's sexual and reproductive health [22-23]. Acculturation is defined as a multidimensional process of socialization involving dominant and nondominant cultures, in which the non-dominant culture always exhibiting greatest effects [24]. Acculturation refers to the changes that groups and individuals undergo when coming into contact with another culture [25].

Previous research has demonstrated that women value the positive changes achieved by migrating to the US, as it has resulted in both an improvement in their economic status and empowerment in their individual reproductive health decisions [20]. Including, higher rates of sexual risk taking at an earlier age, and higher rates of unprotected sexual intercourse than non-accultured women [26], increasing the probability of pregnancies at a young age. Additionally, the implementation of young Hispanic women into Americanized society has resulted in exposure to a culture that is open to conversations pertaining to sexuality. Such as, an increase in sexualized images visually consumed in the media [27-28]. Thus, the interaction of two opposing cultures, when considering sexual expression, can likely place women in a challenging position, where they should decide whether to partake or refrain from risky sexual activities that may perhaps to result in a younger age at first birth than women who have greater adherence to cultural values. Even more challenging is considering the possible effect that a younger age at first reproduction may have on cooperative assistance a mother receives from the grandmother-to-be including that of her social circle and community.

According to the Cooperative Breeding Hypothesis, allomaternal assistance was essential for child survival and quality during the Pleistocene era [29]. Cooperative breeding is generically defined as a breeding-social system in which group members, other than the genetic parents of the offspring, help rear younger members of their community [5-6]. This breeding system allowed for women to produce costly offspring, without increasing interbirth intervals due to the assistance received from other members in their community [5-6, 30]. Today, these breeding systems continue to be important in ensuring offspring quality. Humans demonstrate extremely high degrees of cooperation--encompassing acts of proactive food sharing, cooperative child-care, assistance with division of labor, and teaching and cultural learning, emotional and moral support, amongst others [6-7]. As a result of alloparenting, mothers are ultimately allowed to produce more and larger offspring in shorter interval intervals due to the assistance and care received. Additionally, extended periods of childhood dependency, which characterize human offspring, and short interbirth intervals suggests that mothers often care for several dependent children simultaneously and thus elicit the assistance of other members of their community to promote consistent energetic inputs for infant survival and is often necessary to reduce the demands on time and energy allocated by the mother [7, 31-32]. Most often, cooperative care is provided by the grandmother-to-be, including other kin (i.e., paternal mothers, fathers, siblings) at times [30-31]. In the absence of such cooperative care, we can deduce that the chances of high offspring survival and quality may begin to dwindle.

Because culture provides a framework as to how communities, families, and even the world should operate and as such, it may also greatly influence the cooperative care one receives. When cultural values are not respected, many of the benefits a mother may be provided within their community, such as cooperative care when raising their young, may be neglected. This can further have a detrimental toll on both a mother's and offspring's well-being. Whereas mothers who comply with native cultural norms are more than likely to receive all cooperative care benefits, and other benefits granted by community unity.

The objective of this study is to analyze how Hispanic cultural values affect age at first reproduction in Hispanic women. Including, if, and how, acculturation may be resulting in an earlier age of reproduction, as a result of women adapting to Americanized values while gradually abandoning Hispanic values. Additionally, by adopting a more Americanized identity and abandoning family identity, we expect women to begin reproducing at a younger age than their counterparts as they begin to value their sexual identity and decision-making [20]. However, by doing so Hispanic women may be violating cultural values resulting in loss of alloparenting efforts due to the grandmother's-to-be, and other community member's, disapproval of the expecting mother's actions. This can be viewed as a cultural mismatch, a subdivision of evolutionary mismatch, if violation of cultural values results in the uncoupling of cooperative care from the grandmother-to-be resulting in a decrease in the probability of offspring survival and/or quality, due to changes in Hispanic women life history traits (earlier age at first reproduction, <20 years of age) influenced by new cultural pressures. This suggests that cooperative care is essential in ensuring increased probability of offspring survival and quality, and thus Hispanic women should comply with ancestral cultural values and expectations regarding sexual initiation and reproduction. Furthermore, the transition from an environment in which Hispanic cultural values were established to navigating cultural change in a new environment serves as an evolutionary pressure which has the potential for changes in initial cultural values and practices, including changes in human population biology and evolution.

METHODS

Study Overview

The focus of this study is in a cohort of Latina pregnant women, in Southern California, attending prenatal appointments or prenatal classes at four different sites from 2016-2018: Women's, Infants, and Children (WIC) in Santa Ana, CA, MOMS Orange County in Santa Ana, CA, the Westside Family Health Center in Santa Monica, CA, and Olive View-UCLA Medical Center in Sylmar, CA. Potential participants were over 18 years of age, English or Spanish speaking, pregnant or up to one year postpartum, and self-identify as Latina, Hispanic Chicana, Mexicana, and/or Latin American. Although we recognize the complexity of term identification usage, for the purposes of this study we refer to all women as Hispanic as this term encompasses anyone who is native to, or is a descendent from, a Spanish-speaking country [11,33].

Data Collection Process

Potential recruits were approached in the waiting rooms of the clinics where they had prenatal appointments or at prenatal classes. Women were asked if they were interested in joining a research study pertaining to women's culture, feelings, and experiences as pregnant Hispanic

women, conducted by Dr. Molly Fox at UCLA. Written informed consent was received from women interested in joining the study after full study procedures were described, and women received cash compensation. Upon approval, an anonymous, cross-sectional questionnaire was completed by a total of 361 pregnant and postpartum women, consisting of questions relating to culture and experiences, neighborhood and home inquiries, basic information about pregnancy health, their social relationships, and their feelings pre-and during their pregnancy and feelings post pregnancy (e.g., depression status).

Participants recruited into the study completed this survey anonymously. Prior to starting any part of the study, the women recruited were assigned a patient number to keep track of participant responses anonymously. Questionnaires were also completed using an incognito tab on a tablet device, which ensured that the woman's true identity was concealed.

Values Analyzed

For the purpose of this study, we focused on a subset of the questions asked in the questionnaire. Information for women included in this specific area of interest are women who identified as Hispanic and indicated this to be their first birth. To ensure our focus on only first births, we looked at questions pertaining to parity. If previous births were reported, the entire subject was removed from our dataset. Additionally, we focused on values pertaining to *respecto* and *familismo* to determine an association between these two cultural values and the age at first reproduction. Including cooperative care, from the grandmother-to-be, to determine an association between such cooperative care and age at first birth. Additionally, we analyzed values pertaining to the rate of acculturation and its effects on age at first birth. Missing values for any variables of interest listed resulted in the exclusion of participants from the study to conserve consistency amongst participants. Food insecurity (categorical), education (categorical), and religiosity (continuous) were controlled for statistically. Missing values for controlled variables were replaced with the average of actual reported responses in our data.

Values Defined

In this study, grandmother-to-be refers to the expecting or postnatal mother's mother. While mother refers to the expecting or postnatal mother. Measures for cultural values analyzed were derived from the Mexican American Cultural Value Scale (MACVS)—a 50 item measure of Latino cultural expectations. This measure contains 9 subscales to analyze traditional Latino values and mainstream values. Traditional Latino values include respect, familism, religiosity, and traditional gender roles. Mainstream values include individual success and independent/self-reliance [34]. *Respecto* encompasses an average of a set of items (scale: 0-not at all; 1-a little; 2-somewhat; 3-very much; 4-completely) which describe how children should behave and treat adult figures. This includes items, such as: no matter what, children should always treat their parents with respect; children should respect adult relatives as if they were parents; children should never question their parents' decisions; children should be on their best behaviors when visiting the homes of friends or relatives; it is important for children to understand that their parents should have the final say when decisions are made in the family; etc. [34]. *Familismo* describes an average scale of a set of sub-scales (scale: 0-not at all; 1-a little; 2-somewhat; 3-very much; 4-completely) related to family support, obligation and referent. Items for this value include, but are not limited to, parents should teach their children that the family always comes first; children should be taught that it is their duty to care for their parents when their parents get

old; children should always do things that make their parents happy; it is always important to be united as a family; etc. [34]. Religiosity refers to an average of items encompassing items (scale: 0-not at all; 1-a little; 2-somewhat; 3-very much; 4-completely) related to strong religious beliefs or feelings, such as: children should teach their children to pray; it is important to thank God every day for what one has; God if first, family is second; etc. [34]. Cooperative care (measured as the grandmother's to be and the mother's-to-be relationship reported by expecting mother) was defined as an average between items indicating how nearby the grandmother-to-be lives to the mother (scale: 1-in my home; 2-in my neighborhood; 3-outside my neighborhood but close enough to visit during the day; 4-too far to visit during the day), how often they communicate, and how often they see each other in person (scale: 1-every day; 2-more than once a week; 3-more than once a month; 4-once a month or less; 5-never). This measurement was under the assumption that a stronger relationship between the mother and grandmother-to-be would result in greater cooperative care provided by the grandmother-to-be. Questions used to measure cooperative care are original from the Mother's Cultural Experiences (MCE) study. Age at first birth was calculated as the date in which the mother was born subtracted by expected due date (for mother's yet to deliver their baby) or the date in which the mother was born subtracted by the baby's birthdate (post-natal mothers). Education refers to the degree of education achieved by the mother (scale: 1-elementary school or incomplete secondary school; 2-high school or GED; 3- technical or vocational high school; 4-technical or vocational program after completing high school; 5-Associate degree; 6-Bachelor's degree; 7-certificate after completing Bachelor's degree; 8-Master's degree; 9-Doctorate; 10-other). These questions and scales were extracted from the Pregnancy Experiences and Infant Development Study (PEIDS) at Chapman University and UC Irvine. Food insecurity is an average of a set of items describing families at risk for food (scale: 1-often true; 2-sometimes true; 3-never true), such as: within the past 12 months we worried whether our food would run out before we got more money to buy more and within the past 12 months the food we bought just didn't last and we didn't have enough money to get more [35]. Acculturation was measured along 3 primary factors: language, ethnic identity, and ethnic interaction using the ARSMA-11, a 30-item scale. ARSMA-11 is a multidimensional scale measuring Mexican and Anglo cultural orientation independently using two scales: a Mexican Orientation Subscale (MOS-17 items) and an Anglo Orientation Subscale (AOS-13 items). The average for values pertaining to AOS and MOS were calculated subtracted from one another (AOS-MOS) to attain an acculturation score [36] (scale: Level I-very Mexican oriented; Level II-Mexican oriented to approximately balanced bicultural; Level III-slightly Anglo oriented bicultural; Level IV-strongly Anglo oriented; Level V- very assimilated; Anglicized).

Analytic Cohort

Women included in the data collection process encompass a total of 361 pregnant and postpartum women. As our focus was on first time Hispanic mothers, our sample was reduced to a maximum of 130 pregnant or postpartum women. Our sample was further reduced to N=114 women if data necessary to determine age at first birth was not reported, such as if the mother's birthdate (N=4) or baby's birthdate (N=2) was missing. Additionally, women were removed from the data sample if values pertaining to our variables of interest were completely missing which would, for example, make it impossible to calculate an average for familism and respecto (N=4), including cooperative care provided by the grandmother-to-be (N=6) due to missingness.

Data Analysis

The software SPSS (Statistical Package for the Social Sciences-Version 27)--widely used for complex statistical data analysis--was utilized to perform all analysis listed below using the regression format. Data was exported into SPSS from an excel file containing all relevant variables being analyzed. Variables such as food insecurity, education and cooperative care provided by the grandmother-to-be were dummy coded as to report high and low levels of each variables. Such as, food insecurity (0=minimum or no food insecurity (scale:3), 1=high food insecurity (scale: anything other than 3), education (1=high education (scale:4-9), 0=low or minimum education (scale: anything other than 4-9), and grandmother cooperative care (1=strong cooperative care provided by the grandmother-to-be(scale:>2), 0=minimum or no cooperative care provided by the grandmother-to-be (scale:2-5)). Cooperative care was treated as a binary variable to analyze the effect of the independent variables measured on the cooperative care a mother receives from the grandmother-to-be. Age at first reproduction was treated as categorical (1=reproduction at ≥ 20 , 0= <20), only when performing the second logistic regression model, to effectively measure changes in cooperative care received as a function of age at first reproduction (i.e., at an age that is highly stigmatized or at an age that is more socially accepted). Age at first reproduction was treated as a continuous variable when running multiple linear regression as we were only interested in whether acculturation and cultural values had an overall effect on the age in which women reproduced, rather than whether they reproduced prior to the age of 20. The cut off of age groups was indicative of what was considered socially accepted. For instance, teen pregnancies (pregnancies prior to the age or 20) are normally discouraged in Hispanic culture and are normally highly stigmatized [21, 37-38]. All other variables were treated as continuous variables.

A multiple regression model was developed to evaluate age at first reproduction (dependent variable), and a multiple logistic regression to analyze cooperative care provided by the grandmother-to-be (dependent variable), both as a function of the degree of *respecto* and *familismo* (independent variables). A second logistic regression was performed to measure cooperative care from the grandmother-to-be as a function of age at first birth. Including, a second multiple linear regression model to analyze age at first reproduction (dependent) as a function of degree of acculturation (independent) (figure 1-2). Covariates controlled for in the multiple linear regression analysis included: food insecurity (categorical), education (categorical), and religiosity (continuous). Covariates controlled for in logistic regressions performed included: food insecurity (categorical) and religion (continuous). Multiple linear regressions were performed by placing control variables, including variables of interest, into the model at once. This ensured we controlled for covariates while still analyzing the effects of independent variables on the dependent variables we were interested in. Binary logistic models were performed to predict a significant relationship between the predictors of interest and our predicted variable, where the dependent variable was binary (high cooperative care from the grandmother-to-be or 0/minimum cooperative care from the grandmother-to-be).

RESULTS

Cohort demographics and descriptive statistics are presented in Table 1.

The multiple linear regression evaluating age at first reproduction as a function of the degree of acculturation, along with control variables, was statistically significant (Table 2). The beta

coefficients indicated that with each unit increase in the degree of acculturation, Hispanic women will experience a delay in age at first birth by 0.187 years, after controlling for all other variables. However, results were not statistically significant ($p > 0.05$). Controlled variables education and religiosity statistically predicted the outcome variable (age at first reproduction), while food insecurity did not. Additionally, the effect sizes of religiosity and education on age at first reproduction was greater than other variables in the equation (standardized beta coefficients: .189 and .288, respectively). The direction of the relationship between religiosity and education on the age at first reproduction were positive, meaning that greater degree of religiosity and education is associated with later age at first reproduction.

For the logistic regression analyzing cooperative help received from grandmothers-to-be as a function of the degree of *respecto* and *familismo* (Table 3), the model was not statistically significant. While the odds ratio in this analysis indicates that for every unit increase in *respecto* and *familismo*, the odds of receiving cooperative care from a grandmother-to-be changed by a factor of 1.509 and 1.291, respectively, but these results were also not statistically significant.

For the second multiple logistic regression analyzing cooperative help received from grandmothers-to-be as a function of age at first birth (Table 4), the model was not statistically significant. Although, the odds ratio in the analysis indicates that as age at first birth increased, the odds of receiving cooperative care from a grandmother-to-be decreased by a factor of .354, we cannot confirm its overall significance as the model itself was not statistically significant.

The multiple linear regression evaluating age at first reproduction as a function of the degree of *respecto* and *familismo*, along with control variables, was statistically significant (Table 4). Although the beta coefficients indicated that with each unit increase in the degree of *respecto*, age at first reproduction decreased by -1.022 years, and with each unit increase in the degree of *familismo*, age at first reproduction women increased by .138 years after accounting for all other variables, these effects were not statistically significant ($p > 0.05$). Similar to the model presented in Table 2, control variables religiosity and education statistically significantly predicted the outcome variable. Additionally, the effect sizes of religiosity, education, and *respecto* on age at first birth were greater than the other two variables in the equation (standardized beta coefficients: .238, .266 and -.129, respectively), although *respecto* did not significantly contribute to the model fitting. The direction of the relationships of religiosity and education with the outcome were positive, meaning that as the values of these predictor variables increased, women experienced a later age at first reproduction, which is opposite to what was observed for an increase in *respecto*.

DISCUSSION

Cooperative efforts from grandmothers-to-be, and other forms of alloparenting, is an ancient child rearing pattern which guarantees an increased chance of offspring survival and quality [29-30]. This mechanism of childcare is likely to have been present in most, if not all, human groups throughout our species' history. It is likely that the importance of these social relationships, including shared values between groups, gradually resulted in the development of culture and cultural values. Today, various cultures exist and are representative of differing cultural traits that can be more or less adaptive given the environment in which are expressed in [4]. However,

their purpose remains similar across all--to serve the needs of humans. These needs fall into two categories: (1) needs that can be satisfied by an increased input to an individual's inner resources via increased social interactions between individuals (i.e., singing, dancing, mythmaking, forming associations, etc.) [29]. (2) needs that can be satisfied by an increased input of resources from the external world (i.e., food, protection from enemies, shelter, etc.) [39]. Often, neither of these needs can be efficiently met without the social and physical support of other members of an individual's community. Such social relationships have unified communities and ensure these needs are met by promoting united efforts in assisting members of a community, such as alloparenting efforts. Although these social groups are usually established with the basis of shared values it is likely these cooperative efforts are met including in absence of a strong association to cultural values and with disregard to the age at first reproduction, which is usually influenced by cultural perspectives.

Darwinian fitness describes how individuals are most concerned about reproductive success. By ensuring cooperative care, both in the presence or absence of adherence to cultural values, but especially during a young mother's pregnancy and onwards, grandmothers-to-be are ensuring that the expecting mother, and thus themselves, are successful in passing on shared genes onto future generations. Although effect was not statistically significant, the direction of the values analyzed indicate that younger mothers usually receive more care. Significant cooperative care provided by a grandmother-to-be for young mothers is likely to be important as children born to teenage mothers entails numerous risks, such as: low birth weight, complications for both the mother and child during pregnancy, poor perinatal outcomes, high risk or perinatal death, and lower IQ and academic achievement later in later in comparison to children born to older mothers [40]. Considering this, young mothers necessitate the help of others in providing support both for her and her young, whereas lack of support can be detrimental to the offspring. Additionally, some studies have shown that babies born to mothers with low social support, predominately during early pregnancy, are more likely to be born smaller and were significantly lower in weight than babies whose mothers experience high social support (reduced birth weight by nearly 200g) [41]. Low birth rates can be further detrimental to offspring, as this increases their risk for a range of diseases in adulthood, such as cardiovascular diseases, type 2 diabetes, and osteoporosis [41]. Such outcomes have the potential to directly reduce an offspring's fitness and, consequently, reduces relatives' fitness indirectly. Including, absence of cooperative help may also mean that the grandmother-to-be will not receive reciprocal help in the future from their daughters when they need it the most. Studies suggest that daughters provide the most instrumental and emotional care and support to their natal parents than sons do [42-43], this means that cooperative care from the grandmother-to-be is equally important to the expecting mother, as it is to the grandmother-to-be, to ensure her individual survival in the future.

While the relationship between age at first reproduction and acculturation was not significant, recent studies suggest that sexual risk-taking increased with greater acculturation. Including, greater acculturation was associated with an increased risk of sexual initiation and activity [23, 26] and higher odds of unintended pregnancies [44]. However, such early initiation is not always associated with age at first birth as acculturation is also positively associated with increased condom use [22-24] and oral contraceptive use. Additionally, according to the CDC, in 2015-2017 78% of all females and 89% of all males ages 15-24 in the United States who participated in early sexual activity (before the age of 20) used a contraceptive method, condom use being the

most prominent, at first sexual intercourse [45]. Including, less acculturated women have been associated with older age at sexual intercourse initiation [46]. This suggest that contrary to our findings, traditional Hispanic women and gender role orientation is important for preventing age at first sexual initiation, including age at first birth, whilst acculturation may be a prominent factor influencing earlier sexual initiation and pregnancies.

Furthermore, while previously studies have suggested that *respeto* and *familismo* are important cultural factors preventing earlier age at sexual initiation and play a prominent role in later ages at first reproduction [15, 18-21], our analysis failed to identify significant support for this hypothesis. This, however, does not mean that *respeto* and *familismo* are not important indicators of later age of reproduction in Hispanic women, but rather a more thorough analysis must be performed. For instance, this study looked at *familismo* holistically, combing family support, family obligation and family referent together. Future studies should perhaps measure age at first reproduction as a measure of *familismo* in these three separate sub-scales. Additionally, it is highly possible that our small sample size was too small to predict significant results and thus a larger sample size is needed.

Although a controlled variable, religiosity appeared to be a significant factor affecting age at first reproduction in Hispanic women. Such as, more than half of the women in the cohort studied expressing strong religious feelings or support. The role of religiosity is quite evident in Hispanic culture and society. For instance, religiosity is positively associated with less permissive attitudes and less sexual experiences in individuals who attend church frequently [47] Additionally, in several religions, sex is often viewed as an act individuals engage in only within marriage [48] and is looked down upon otherwise, which may explain why our analysis suggests that stronger association with religion resulted in later age at first reproduction. Additionally, oftentimes, sex is even an act performed not for pleasure but rather for procreative purposes alone [48]. Furthermore, as other studies have proposed, when controlling for other factors, such as social economic status, individuals showing higher levels of religious attendance and importance to religion are more likely to disprove of premarital sex [49]. Although new immigrants may be exposed to an entirely new culture in the United States in which sexuality is openly spoken about, it is likely that they continue to be anchored strongly to traditionally religious and cultural expectations regarding sexuality and fertility outside and within marriage [48]. Given that religiosity was a significant factor affecting age at first reproduction, it is likely that Hispanic women surveyed in this study were raised in religious households, or simply households with traditional religious ideals, resulting in these ideals playing a significant role in their decision making, actions and beliefs as future adults, predominately related to sex in this case.

A second controlled variable, education, was also a significant factor affecting age at first reproduction in Hispanic women. Although only a little over a quarter of a women indicated receiving more than just a high school education, education significantly resulted in later ages of first reproduction than women who received only a high school education or less. These results support other studies, in which the greatest proportion of nulliparous women were those that were considered to be the most educated (college/university degree) compared to least educated women (no formal education), and also reported having the least number of children than those who were least schooled [49] The later onset of reproduction is likely due to the time commitment to school, including women's aspirations to be well established in their careers prior

to reproduction. Additionally, the responsibility and obligations associated with balancing work life and caring for a baby, or children, is likely to deter women from earlier reproduction [51].

Although this study failed did not support our hypothesis, it may be too premature to confidently conclude that cultural values and acculturation definitely have no effect in the age at first reproduction in Hispanic women or that the age at first reproduction and adherence to cultural values definitely does not affect the degree of cooperative care an expecting mother receives from the grandmother-to-be. What does hold true across studies, however, is that individuals who have previously, or whose parents previously, migrated into the United States are often placed in conflicting environments (between home environments and their newfound environment in the United States) due to cultural transitions, resulting in cultural mismatches in various forms which may later even result in mental health implications [52-54]. This study focused on the cultural mismatches that may occur between Hispanic women assimilating in the United States. And because of their integration into a new environment excessively open about conversations pertaining to sexuality--much different from their home environment--women may be placed in a conflicting situation in which they may learn to value their sexuality and own decision making but of which their home environment is not always accepting of. This transition may result in an earlier age at first birth, further affecting the cooperative care a mother receives from the grandmother-to-be due to their “disobedience” to their original cultural values (Figure 1). Further studies, with larger sample sizes, are needed properly understand these relationships because effects are likely modest in size.

Tables and Figures

Figure 1. Conceptual model demonstrating series of events resulting in a cultural mismatch in Hispanic women in the United States.

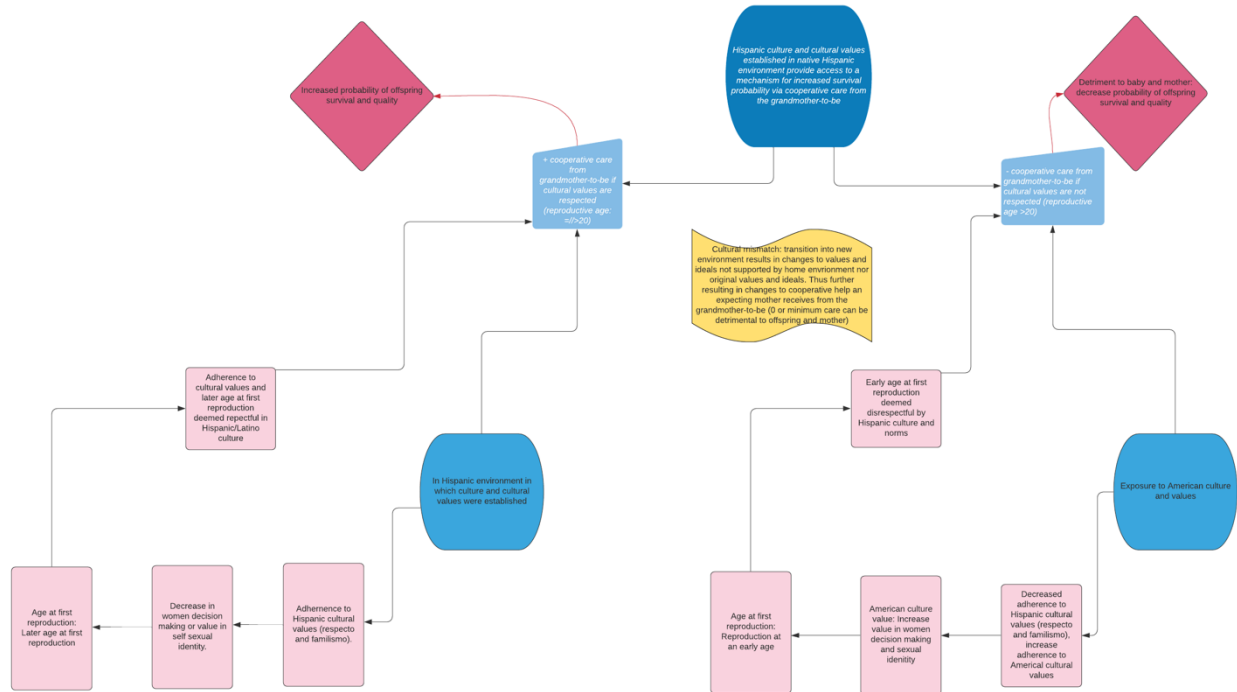


Figure 2. Operationalized Model demonstrating how we will conduct the analysis.

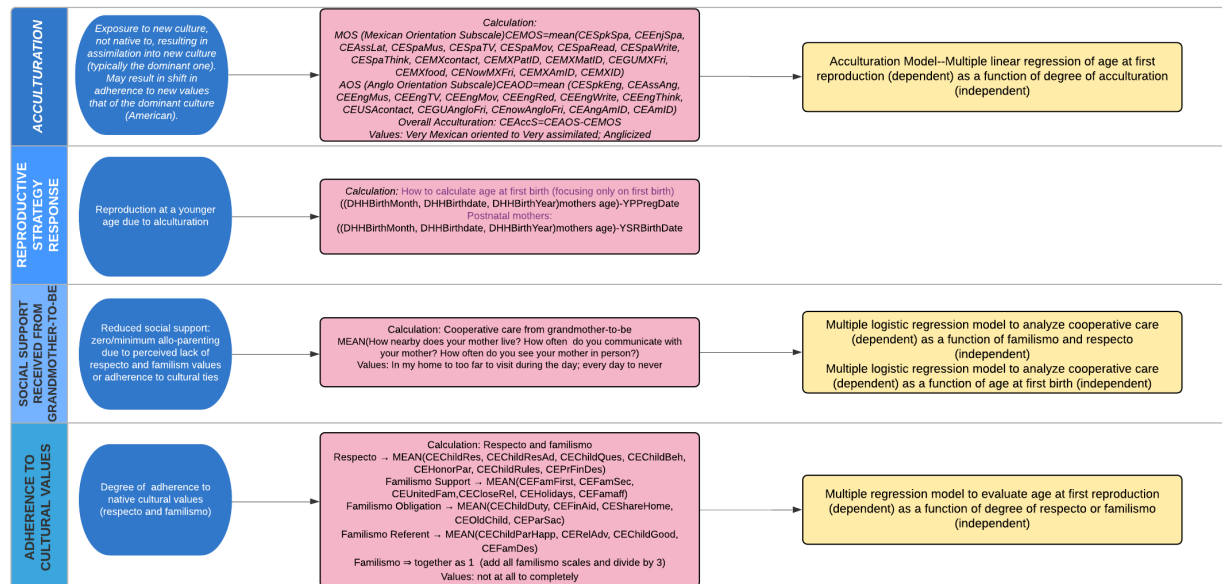


Table 1: Cohort demographic and descriptive statistics, showing Mean (SD) for continuous variable and N (%) for categorical variables.

Age at First Reproduction	24.18 (5.357)
<20	25 (21.9%)
=/>20	89 (78.1%)
Food Insecurity	
Food Insecure	54 (47.4%)
Not Food Insecure	60 (52.6%)
Education	
High Education	28 (24.6%)
Low Education	86 (75.4%)
Religiosity	2.998 (.953)
Acculturation	-.123 (1.351)
Respecto	3.085 (.677)
Familismo	2.963 (.639)
Cooperative Care	
+ Cooperative Care	58 (50.9%)
- Cooperative Care	56 (49.1%)

Table 2. Multiple linear regression analysis of age at first reproduction in cohort of Hispanic women (N=114) as function of the degree of acculturation (independent variables).
F(4,109)=4.543, adjusted R²=.111, p=.002.

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	20.671	1.676		12.335	.000
	Food Insecurity	-1.114	.981	-.104	-1.136	.259
	Education	3.565	1.110	.288	3.211	.002
	Religiosity	1.065	.500	.189	2.130	.035
	Acculturation	.187	.361	.047	.518	.605

Table 3. Logistic regression analysis of cooperative help received from the grandmother-to-be in a cohort of Hispanic women (N=114) as function of the degree of *respecto* and *familismo* (independent variables).

	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I for Exp (B) Lower	95% C.I for Exp (B) Upper
Food Insecurity	-.409	.388	1.116	1	.291	.664	.311	1.419
Religiosity	-.214	.249	.742	1	.389	.807	.496	1.314

Respecto	.412	.447	.847	1	.357	1.509	.628	3.627
Familismo	.256	.512	.250	1	.617	1.291	.474	3.520
Constant	-1.158	.991	1.364	1	.243	.314		
Model χ^2 =	4.270	p. = .371						
Pseudo R ² =	0.049							

Table 4. Logistic regression analysis of cooperative help received from the grandmother-to-be in a cohort of Hispanic women (N=114) as a function of age at first birth.

	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I for Exp (B) Lower	95% C.I for Exp (B) Upper
Food Insecurity	-.344	.385	.799	1	.371	.709	.333	1.508
Religiosity	.099	.208	.226	1	.634	1.104	.735	1.658
Age at First Birth	-1.038	.488	4.529	1	.033	.354	.136	.921
Constant	.713	.726	.963	1	.326	2.040		
Model χ^2 =	5.712	p. = .127						
Pseudo R ² =	.065							

Table 5. Multiple linear regression analysis of age at first reproduction in cohort of Hispanic women (N=114) as function of the degree of respecto and familismo (independent variables). F(5,108)=3.858, adjusted R²= .112, p=.003.

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	22.532	2.505		8.996	.000
	Education	3.295	1.133	.266	2.908	.004
	Food Insecurity	-.906	.964	-.085	-.940	.349
	Religiosity	1.339	.613	.238	2.185	.031
	Respecto	-1.022	1.111	-.129	-.920	.360
	Familismo	.138	1.265	0.016	.109	.913

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