

INTERNATIONAL ARTICLE

Assessing the Impact of Adolescent Pregnancy and the Premarital Conception Stress Complex on Birth Weight Among Young Mothers in Gibraltar's Civilian Community

L.A. SAWCHUK, S.D.A. BURKE, AND S. BENADY

Purpose: The objective of this study was to assess the impact of young maternal age and the timing of conception on birth weight among primiparous women living in Gibraltar.

Methods: The data for this study were derived from a population of 295 primiparous women who gave birth under 25 years of age. Only married women who had no previous maternal history and delivered live singleton newborns between 1980 and 1984 were included. The confounding effects of gestation length, sex, and socioeconomic status on birth weight were taken into account using the multivariate technique of multiple classification analysis. A conception timing variable was constructed and partitioned into four groups which represented the separate and joint effects of maternal age and pre-nuptial stress on birth weight.

Results: The overall mean birth weight was 3344.15 g. After controlling for the specified factors and covariate, the infants of older mothers (>19) who conceived after marriage weighed 57.78 g above the referent group mean. Older mothers who conceived a child before marriage delivered infants weighing 75.67 below the grand mean. Young mothers (<20) who conceived within marriage had infants who weighed 37.32 g less than the grand mean. Infants delivered by young mothers who conceived before marriage weighed 133.66 g less than the overall mean birth weight. The only significant group

difference detected within the conception timing variable was between young mothers who conceived before marriage versus older mothers who conceived after marriage.

Conclusions: Premarital conception is identified as a risk factor for lower infant birth weights among mothers under 20 years of age. This study emphasizes the need to take into account the effects of culturally mediated behavior on the pregnancy experience of young women.
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Adolescent pregnancy has received considerable attention in health sciences, since infants born to young mothers have an increased risk of low-birth-weight (LBW) and mortality (1-3). While investigators acknowledge that LBW among young mothers is the product of both biological and social factors (4), the debate continues regarding the relative importance of each of these factors in the expression of birth-weight variation in young mothers. Some investigators argue that the age of young mothers is a risk factor (5), while others stress the importance of dietary (6), sociodemographic (7-9), and psychosocial factors (10-12) affecting women in younger age groups.

From the Department of Anthropology, University of Toronto at Scarborough, Scarborough, Ontario, Canada (L.A.S., S.D.A.B.); and St Bernard's Hospital, Gibraltar (S.B.).

Address reprint requests to: Dr. L.A. Sawchuk, Department of Anthropology, Division of Social Science, University of Toronto at Scarborough, 1265 Military Trail, Scarborough, Ontario M1C 1A4 Canada.

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This research is based on the possibility that conception prior to marriage in traditional small-scale communities can be a behavioral risk factor that contributes to lower birth weight. We identify this culturally sensitive psychosocial state as the premarital conception stress complex (PCSC). During the interval between pregnancy determination and marital resolution, the effects of increased stress, heightened anxiety, and reduced nutritional intake coalesce and can negatively affect maternal health and fetal development. The temporal dimension associated with PCSC is particularly important, as it is manifested during the latter part of the first trimester, marking a critical phase for the future growth and development of the fetus (13). The actual impact of premarital conception depends on not only an individual's personal and familial resources but also society's expectations of the sequential timing of pregnancy and marriage. Accordingly, this study follows in the anthropologic tradition of contextualizing the sociocultural milieu in which the young mother is raised and resides. Furthermore, this community-based study opportunistically avails itself of the fact that premarital conceptions are frequent in this society and unscheduled pregnancies are invariably followed by marriage. To capture these effects on birth weight, an intuitively simple model is constructed with the aid of a multivariate approach which incorporates important confounding variables.

Study Population

Located at the western gates of the Mediterranean, the civilian population of Gibraltar is a cohesive, small-scale community of people of diverse origins who have lived under British colonial rule since 1704. Gibraltarians enjoy a relatively high standard of living and during the study period unemployment was very low at 2.4% (14). The life expectancy at birth for males and females is 71.4 and 75.7 years, respectively (15). The majority of the Rock's 19,825 inhabitants adhere to the Roman Catholic faith (91.4%). A distinctive bilingual speech pattern of English and Spanish (Yanito) identifies the Gibraltarian as does a high degree of religiosity. While Gibraltar occupies 5.82 km² of land space, a substantial portion of the Rock is uninhabitable.

From an anthropologic perspective, Gibraltar presents many of the facets of a small insular community, though urban in nature owing to problems such as overcrowding and its function as a major port city

for Atlantic and Mediterranean shipping traffic. Face-to-face contact is a daily occurrence among Gibraltarians, so much so that they frequently substitute "bye" for the familiar "hello" when greeting people from town. This gesture is not interpreted as discourteous; rather, it is a necessary social adaptation for small community living. Geographic mobility and its associated influence on extramarital sexual activity (16) can be ruled out in this population, which shows marked demographic stability with the majority of individuals remaining in Gibraltar from the cradle to the grave.

Traditional Andalusian gender roles remain ingrained in much of Gibraltarian society. The young Gibraltarian female's expectations about the timing of marriage and parenthood are guided by religion, influenced by strong family ties, and grounded in community tradition (17–20). Courtship, or *noviazgo*, in Gibraltar can begin as early as 14 or 15 years and typically is destined to lead to marriage. It is important to stress here that courtship is not analogous to dating, but is rather a lasting commitment that is made early on in life. Broken formal courtships are rare, but when they occur they can have long-term marital consequences. The stigma of a broken courtship often forces one or both of the couple into exogenous unions, or into permanent single status. Women are more likely to remain single after a broken courtship, since they may be more culturally stigmatized and in a less favorable position to initiate a subsequent courtship. The ideal situation, however, is one in which the courtship remains intact for a number of years. The long courtship promotes greater awareness both of each other and respective kinship networks, and on a practical side, it is also the time when the couple saves for the items required to establish a separate household upon marriage. Children are highly prized, and pregnancy shortly after marriage is both desirable and encouraged. Unlike some populations (21–23), nonmarital births are rare; <2% of children born in Gibraltar between 1945 and 1984 were born out of wedlock. In Gibraltar, there are at least three plausible explanations for this low level of births outside wedlock: the Roman Catholic church's opposition to extra marital births, the existence of the honor/shame dichotomy, and the constraints of living within an all-knowing and tightly knit community.

There is a possibility that low-income neighborhoods within communities may pose consequences quite apart from those of low income on birth weight in itself (7). These neighborhoods often lack adequate medical facilities and convenient public transporta-

tion to medical facilities, while possessing high levels of violence and other sources of stress and relatively low levels or quality of social services. While Gibraltar shares some of the problems seen in large American cities, such as overcrowding and a shortage of proper accommodation for the working classes, there are substantial differences.

Gibraltar has retained its traditional values of neighboring help and friendliness, with low levels of major crime, mutual respect for privacy, and a high degree of religious tolerance. The civilian hospital is centrally located and minutes away from virtually all of Gibraltar's inhabitants. Following the English system, health care is subsidized by the government with the exception of the services of private physicians; as a result, the possibility for differential effects of prenatal care among women in this sample will be minimized. Antenatal classes are well attended by young mothers, and unless the pregnant woman chooses to be a private patient or presents complications, all deliveries are performed by midwives. Through antenatal clinics run by the maternity department, the midwives and nurses follow each of the women through their pregnancies beginning at 3 months after conception. The strong positive bond between the midwives and pregnant women is fostered during this period of antenatal care and is further strengthened by the midwives' membership in the local community.

Because of the religious and traditional nature of the community, abortions cannot be procured in Gibraltar. Alternatively, women may choose to seek gynecologic and obstetric services offered in nearby Spain. The border closure between Spain and Gibraltar during the early 1980s study period, however, eliminated this particular option. While women may have resorted to services in England and Morocco, their resources would have to overcome the combination of greater distances and costs. It is unlikely, therefore, that selectivity or censoring owing to abortions will produce any significant amounts of unobserved heterogeneity in the community during this time period. The issues of unobserved heterogeneity and its importance in birth weight investigations have been raised elsewhere (7).

Materials and Methods

The sample consisted of infants born in the maternity department of St. Bernard's Hospital, Gibraltar. The hospital data includes virtually all of the infants born to Gibraltar women, as St. Bernard's is the only

civilian hospital and few children are delivered at home. The sample was limited to primiparous married mothers who gave birth to live singleton infants before their 25th birthday. The analysis also excluded women who had a previous conception that did not come to term. To minimize any confounding influence through religion, only Christian births were considered. Previous research in this community has shown that maternal birthplace (either within or outside of Gibraltar) did not significantly affect birth weight.

This study was limited to a 5-year time frame, January 1, 1980, to December 31, 1984. This period was chosen as it represents a baseline for the long-term community adaptation to the political, economic, and social isolation resulting from the border closure between Gibraltar and Spain. From the summer of 1969 to February 1985, Gibraltar became a more insular and self-sufficient population as all ties with the Spanish hinterland were severed. It is only now that the social implications of the 15th Siege of Gibraltar are being addressed (20,24).

The maternity ward birth register provided information on the reproductive history of the mother at birth as well as particulars regarding the delivery and the status of the infant at birth. Husband's occupation, retrieved from the birth registers held at Gibraltar's Registry Office, was used as a proxy measure of socioeconomic status (SES). Date of marriage was extracted from the Gibraltar Government's marriage registers. Length of gestation was determined from the date of the last menstrual period. All women who had their first child during the initial 7 months of marriage were coded as a nonmaritally conceived birth. This conservative operationalization of legitimation has been used in other recent work (25-27). The study was designed to focus specifically on the effects of premarital pregnancy. To eliminate the possibility that this measure is reflecting the effects of infants born preterm, we excluded preterm infants or infants with a gestational age of <37 weeks from the sample. To capture the potential effects of adolescent pregnancy, mothers were distinguished on the basis of age as young (≤ 19 years) and old (20-24 years of age).

Multiple classification analysis (MCA) was used to evaluate the effects of factors (for example, sex) and covariates (for example, gestational age) on birth weight, the dependent variable, as measured in grams (28). A hierarchic model was employed with gestational age entered before the designated factors were considered. MCA yields information on the unadjusted means, the means (what the mean would

Table 1. Characteristics of the Sample^a of Primigravid Women Who Gave Birth to Singleton Infants Born Live and at Term in Gibraltar: 1980–1984

No. of Women	295
Mean age at marriage	19.14 years
Age distribution of women at first birth (years)	
15	1.4%
16	3.4%
17	6.4%
18	7.8%
19	12.9%
20	9.5%
21	16.9%
22	12.2%
23	15.3%
24	14.2%
Mean interval between marriage and first birth	1.80 years
Percentage of women holding a job at the time of marriage	83.1%
Percentage of women married to low-SES males	21.0%
Percentage of births born within 7 months after marriage	23.1%

^a Sample consisted of women aged 15–24 at the time of their firstborn who had no prior conception. Only Christian women were included.

have been if the group had been exactly like the total sample with respect to its distribution over all other predictors), the eta (the ability of the predictor, using the categories given, to explain variability in the dependent variable), and the beta, which is analogous in interpretation to the standardized regression coefficient in ordinary least squares and is proportional to the explanatory power of the independent variables. We make use of the pattern variable option in MCA, which allows for the construction of a categorical interaction variable, termed here as conception timing, that captures the separate and joint effects of adolescent pregnancy and the PCSC.

Results

The sample consisted of 295 women (Table 1). On average, this group married at 19.14 years of age and had a mean interval of 1.80 years between marriage and first birth. Approximately one-third of the sample gave birth before their 20th birthday, and the majority of women held a job at the time of marriage. Just over one-fifth of the infants were born within 7 months of marriage. With the exception of a small residual of LBW children, the distribution of birth weight in Gibraltar followed a Gaussian distribution. Only 2.4% of the births fell below 2500 g (Table 2).

Table 2. Percentage of First Births, by Birth Weight: Gibraltar, 1980–1984^a

Weight g	%
<2500	2.4
2500–2999	19.3
3000–3499	40.3
3500–3999	31.6
≥4000	6.4

^a *n* = 295 births.

The overall model, which included gestational age as a covariate and infant sex, the timing of conception, and SES as factors, collectively explains a significant amount of birth-weight variability (Table 3). The adjusted r^2 value indicates that approximately 11.9% of the variation in birth weight was accounted for by gestational age, sex, conception timing, and SES. Even after eliminating preterm infants, gestational length proved to be significant and by itself accounted for 2.5% of variability in birth weight.

Table 3. Multiple Classification Analysis of Birth Weight by Sex, Conception Timing, and Socio-economic status (SES), Controlling for Length of Gestation

Source of Variation	df	Significance of F			
Covariate gestational age	1	0.000			
Main effects	5	0.001			
Sex	1	0.001			
Conception timing	3	0.008			
SES	1	0.229			
Two-way interactions	7	0.259			
Sex · conception timing	3	0.780			
Sex · SES	1	0.570			
Conception timing · SES	3	0.144			
Three-way interaction					
Sex · conception timing · SES	3	0.899			
Birth weight grand mean = 3344.15 g					
Variables and Categories	<i>n</i>	Unadjusted Deviation	η	Adjusted for Independents and Covariates	β
Sex					
Male	151	91.27		83.45	
Female	144	-95.71	0.22	-87.51	0.20
Conception timing					
<20 years	41	-83.55		-75.67	
Normative	186	61.59		57.78	
<20 years and PCSC	53	-142.20		-133.66	
≥20 years and PCSC	15	-32.87	0.20	-37.32	0.18
SES					
High and middle	233	21.84		14.96	
Low	62	-82.07	0.10	-56.23	0.07
Multiple $R = 0.345$					
Variance explained = 11.9%					

Both sex and timing of conception attained moderately high beta values and were significant factors in the expression of birth weight. No significant interaction was detected between the specified independent variables, thereby fulfilling an inherent assumption in MCA.

A total of 295 infants born to primigravid mothers yielded an average birth weight of 3344.15 g (Table 3). This overall mean became the referent for the remainder of this section. After controlling for specified factors and gestation length, male infants weighed 83.45 g above the grand mean, while female infants weighed 87.51 g less than the overall mean. Although the results were not statistically significant, infants born to mothers of low SES displayed an adjusted mean birth weight of 3287.92 g, while infants of either high or middle SES had an adjusted mean birth weight of 3359.11 g.

The adjusted mean birth weight according to the timing of conception revealed a distinctive pattern. Among those women who conceived after marriage, infants born to older mothers attained a birth weight of 57.78 g above the grand mean, and those born to young mothers weighed on average 75.67 g below the grand mean. Infants born to older mothers who were under prenuptial stress also displayed lower birth weights in the order of 37.32 g less than the grand mean. The greatest dampening effect on birth weight, however, was observed among young mothers who experienced PCSC. After adjusting for the effects of gestational age, sex, and SES, infants in this category weighed 133.66 g less than the overall mean.

We identified three instances which resulted in a negative impact on birth weight: young maternal age, older maternal age paired with premarital conception, and the combination of young maternal age and premarital conception. To evaluate which groups gave rise to statistical significance, the standard error of the beta coefficient was computed following the methodology of Jensen (29). This, in turn, allowed us to establish the 95% confidence limits of each of the subgroup's respective birth weights. For example, after controlling for gestational age, sex, and socioeconomic status, we could be 95% confident that the average birth weight for infants of women over 20 years who conceived after marriage ranged between 3346.76 and 3457.09 g. Using this as our referent subgroup, only young women who conceived before marriage fell outside this range with 95% birth-weight limits set at 3107.14–3313.84 g, a minimal difference of 32.92 g and a maximal difference of 349.95 g. While there

was a dampening effect associated with young maternal age and premarital conception among women over 20 years, the only statistically significant difference detected lay among young mothers with PCSC versus older mothers who conceived after marriage.

Discussion

The results indicate that in this traditional Mediterranean community, both young maternal age and PCSC had a dampening effect on birth weight. While our findings indicated no significant association between biological immaturity and lower average birth weight, there are several possible explanations. First, the lack of detailed anthropometric information and weight gain data for this community and our subsequent inability to control for these covariates may have diminished the perceived effects of young maternal age. Second, our designation of 20 years of age as the cutoff may have been more appropriate for determining the social and behavioral contexts of adolescence versus nonadolescence than biological associations. It is more likely that the features of biological immaturity—for example, young gynecologic age (defined as conception within 2 years of menarche) and the effect of teenage women becoming pregnant before their own growth has ceased (30–32)—may have affected adolescents at the younger ages of the adolescent spectrum than 18- or 19-year-olds. Therefore, one limitation of this study is our inability to collect data on gynecologic age.

To understand how PCSC may affect a young mother's well-being and fetal development in Gibraltar, it is important to explore dimensions of sociocultural setting and how this, in turn, impacts on the perception of pregnancy and marriage at the individual, familial, and community levels. As has been empirically demonstrated, it was common for a marriage to be precipitated by a pregnancy. While it is true that these women took risks sexually and became pregnant, it is important to recall that they did so within a cultural system promoting courtship and not dating. The pregnancy may serve to expedite the progression of the courtship, especially among adolescents who would not have been in relationships for as long as women over 20 years of age, and the issue of marriage between the couple becomes a source of great concern to parents, relatives, and friends.

Pregnancy out of wedlock can touch deeply into the Gibraltarian ethos of honor and shame, cultural values which are endemic to the Mediterranean

region. An unmarried pregnant woman is physical evidence of the loss of virginity, a highly cherished and idealized symbol of womanhood in traditional Gibraltarian families. It is also confirmation of the fact that the woman has broken the basic fundamental rules of honor in the family, and chastity and purity before marriage.

Social mechanisms strongly promoting the resolution of premarital conceptions through marriage are aspects of a tradition which is entrenched in Gibraltarian culture. The longstanding existence of this tradition is borne out by the observation that 22.05 percent of births of occurring to primiparous mother married between 1900 and 1933 were conceived prior to marriage; once again, however, the actual number of births out of wedlock is low. These findings are in agreement with Goddard's (33) understanding that a code of honor and shame does not preclude sexual activity among unmarried couples; rather, full sexual activity is permitted with the foresight that this is a right which the couple will attain through marriage. Goddard observed that in Naples, considerable parental pressure and control is exercised over young men to resolve the issue of a premarital pregnancy through marriage *di riparamento* (of repair).

The psychological well-being experienced by the unwed mother will be directly influenced by how quickly the issue of marriage can be resolved and the potential level of support forthcoming from the biological father. Previous studies have shown that lower levels of distress are associated with male support (34). If the couple fails to resolve the necessity of marriage, considerable pressure is subsequently applied by family, kin, friends, and even coworkers.

During this period of marital uncertainty, the unwed mother is subject to considerable stress and anxiety through shame, reproach, and family dishonor. The rule of automatic expulsion from Gibraltarian schools may further increase a young woman's distress by the loss of social contact with friends and peers. It is during this period that the unwed woman may consciously attempt to conceal her pregnancy from parents and friends by eating less. Reduced nutritional intake and its negative effect on birth weight (35,36) may also occur unconsciously as the mother's emotional state during this period of marital uncertainty depresses her appetite. She might also turn to smoking and/or alcohol use (4,37-39).

The potential effects of PCSC subsidy once marriage arrangements are formalized as financial and emotional support is forthcoming from family.

Grandparents and relatives play an active role in this community in the upbringing and schooling of the child. In this small, close-knit community, social support during pregnancy is actively given by friends and neighbors. Additional support for new-lweds is provided by the Government's Housing Commission, which awards more points (in a point-driven priority list) to married couples with children for state-assisted housing. If state-assisted housing is unavailable, the couple and the infant are welcomed into one of the couple's parental homes until affordable housing is made available.

Information on smoking behavior is sparse and inconsistently reported to the midwives. In our sample, we were able to identify smoking behavior for only 60 women. We could detect no significant difference in smoking behavior related to either young maternal age or marital status at the time of conception. Smoking, however, is deeply ingrained in the Gibraltarian ethos, with smoking in the home, office, and shops commonplace and widely accepted as the norm. Among women smoking is a recent post-World War II phenomenon and has been shown to be independent of SES (unpublished observations). Both smoking and alcohol consumption during pregnancy are areas requiring further study in Gibraltar. The use of hard drugs in Gibraltar is extremely rare, and consequently, it is not considered to pose a widespread risk factor for lower birth weight in this community.

As an alternative, the prospect of remaining in Gibraltar as an unwed mother is perceived by some women to have been an undesirable option in the 1980s. The lack of affordable housing, limited employment opportunities, and no state welfare system are important pecuniary deterrents to choosing to remain a single mother in this community. Leaving the community is not an appealing prospect either, as it literally means the unwed mother has to leave the country, since the entire territory of Gibraltar is <6 km². With the border closed between Spain and Gibraltar, emigration to the United Kingdom has been the only option. For most unwed mothers, this would mean complete physical, social, and psychological isolation from family, friends, and community.

Based on findings of clustering behavior among adolescent women with extramarital pregnancies in the United States, Small and Luster (40) identified the strongest predictors for sexual activity as frequent use of alcohol, involvement in a committed relationship, low parental monitoring, permissive parental values, low grade-point average, and a

history of sexual abuse. In a later study (41), they targeted those sexually active adolescents who were more likely to show sexual risk taking. Among females, the characteristics included low grade-point average, frequent alcohol consumption, low levels of parental monitoring, and a lack of communication about birth control with mothers. At this initial phase of our research, it is difficult to assess which of these factors may operate in Gibraltar. It is true that the courtship system in Gibraltar leads adolescents into committed relationships early on in life, and this, according to Small and Luster's findings, increases the chances that they will partake in sexual intercourse. It is also the case that contraception is difficult or embarrassing to obtain in this community. This inavailability will increase the probability of sexual risk taking among those sexually active. We do not yet know to what extent the other elements of the risk-taking behavioral cluster, such as poor academic performance and alcohol consumption, are present among these premaritally conceiving adolescent women. This whole area warrants further investigation, since a woman who takes risks sexually and becomes pregnant is more likely to continue other risky behaviors such as smoking and alcohol consumption during her pregnancy. From an anthropologic perspective, however, we do not expect that clustering behaviors will operate in an identical fashion to those in the United States, owing to the unique elements of Gibraltarian culture, such as the dating or multiple-partner taboo.

Conclusion

This study represents a first step in an area of research focusing on the effects of culturally mediated behavior on pregnancy that requires further in-depth investigation. Gibraltar represents a small-scale community with traditional values based on the protection of family honor. Shame and shameful behavior are experienced on an individual level, but are also a reflection of the family to which the individual belongs. This concept of honor and shame is a widespread cultural phenomenon, and it is likely, therefore, that the effects of PCSC may not be peculiar to Gibraltar. The generality of these findings awaits future research in communities with similar cultural traditions. Since there were only a limited number of variables available to us in this retrospective study, further attention should be directed at addressing issues of conception timing and its effects on female behavior in terms of increased anxiety,

reduction in dietary intake and its effect on nutritional status, and increased use of smoking and/or alcohol to assuage a distressed emotional state. More recent data should also be analyzed to determine whether any change has occurred over time.

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