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## Preventing adolescent pregnancy: Biological, social, cultural, and political influences on age at first sexual intercourse

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### Abstract

Age at first sexual intercourse (AFSI) is the initial factor related to adolescents' sexual life that may increase the risk of adolescent pregnancy. We explored the biological, social, cultural, and political predictors of AFSI addressing several gaps that prevent us from generalizing the results of past research to adolescent pregnancy prevention. We also explored the moderating effects of cultural variables on the links between social and political predictors and AFSI. Our sample consisted of 889 Portuguese female adolescents aged 12-19. Earlier age at menarche, non-intact family structure, maternal history of adolescent pregnancy, lower maternal emotional warmth, absence of religious involvement, and living in Portugal's mainland and in a legal context penalizing abortion predicted earlier AFSI. School attendance predicted earlier AFSI among adolescents of European ethnic origin; adolescents of non-European ethnic origin presented the opposite, but non-significant, pattern. These findings suggest that, in addition to isolated characteristics, factors from different ecological contexts should be considered when planning interventions designed to foster healthy and informed transitions to sexual initiation and prevent the related risks of unwanted outcomes. We discuss implications for future research and practice.

**Keywords:** adolescent pregnancy, age at first sexual intercourse, ecological contexts, prevention, risk identification.

## Introduction

Adolescent pregnancy remains a major concern in many developed countries (Santelli, Lindberg, Finer, & Singh, 2007; United Nations Population Fund, 2013). In the European Union, the Portuguese adolescent pregnancy rate was, until very recently, surpassed only by that of the United Kingdom (Eurostat, 2004). The latest statistics show that, on average, 4% of Portuguese live births are from adolescent mothers. However, in some Portuguese areas such as the Azores Islands, this rate is higher than 7% (Instituto Nacional de Estatística [INE], 2011a).

Early AFSI has been consistently identified as the initial factor related to adolescents' sexual life that places adolescents, particularly females, at elevated risk of unintended pregnancy (Hawes, Wellings, & Stephenson, 2010; O'Donnell, O'Donnell, & Stueve, 2001; Wellings, Wadsworth, Johnson, Field, & Macdowall, 1999). Accordingly, several authors stress the need for information on the etiology of AFSI, which would allow interventions to be tailored to those adolescents who are at elevated risk for engaging in early sexual intercourse and, thus, to prevent pregnancy at the beginning of adolescents' sexual lives (O'Donnell et al., 2001; Valle, Torgersen, Røysamb, Klepp, & Thelle, 2005; Wellings et al., 1999).

A large body of research has portrayed AFSI as an outcome that is influenced by individual, relational, and contextual variables (Jordahl & Lohman, 2009; Pearson, Kholodkov, Henson, & Impett, 2012; Zimmer-Gembeck & Helfand, 2007). However, research on AFSI has usually either examined the roles of isolated factors or limited its scope to specific life domains (Zimmer-Gembeck & Helfand 2007). To our knowledge, few recent studies (Jordahl & Lohman, 2009; Pearson et al., 2012; Ramirez-Valles, Zimmerman, & Juarez, 2002) have examined a large number of potential predictors of AFSI, considering factors from different life domains and identifying which are the strongest predictors. The cultural conditions under which the associations between identified predictors and AFSI occur have also been less explored (Zimmer-Gembeck & Helfand 2007). Furthermore, several conceptual options (e.g., inconsistent "early/normative" dichotomizations of AFSI) and methodological decisions (e.g., the inclusion of both females and males without regard for the role of adolescents' biological sex, samples with small age ranges, and participant recruitment limited to school settings) prevent us from generalizing the results of past research to the particular context of adolescent pregnancy prevention.

Based on an ecological approach (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 1998) and with goals of addressing these issues, we examined the contributions of several biological, social, cultural, and political variables to the AFSI using a sample of adolescent females recruited from multiple educational and health settings. We also explored the possible moderating effects of cultural variables on the links between social and political predictors and AFSI.

### *AFSI as a risk factor for adolescent pregnancy*

Engaging in first sexual intercourse is a developmental transition that is occurring at increasingly early ages in most developed countries (Ferreira, Cabral, Aboim, Vilar, & Maia, 2010; Rafaelli & Crockett, 2003; Santelli, Lindberg, Abma, McNeely, & [Resnick](#), 2000). In Portugal, during the last three decades, women's mean AFSI decreased from 21.2 to 17.2 years old (Ferreira et al., 2010). Furthermore, the latest statistics

show that, at the age of 15, 18% of Portuguese female adolescents have already engaged in sexual intercourse (World Health Organization [WHO], 2012).

Past research robustly demonstrates a higher risk of adolescent pregnancy as AFSI decreases (Hawes et al., 2010; Wellings et al., 1999), for two main reasons. First, early AFSI increases the period over which adolescents can become pregnant. Second, early AFSI has been associated with other sexual behaviors related to the risk of adolescent pregnancy, such as high frequency of sexual activity, high number of sexual partners (Moore, Miller, Gleib, & Morrison, 1995; O'Donnell et al., 2001), unprotected sexual intercourse (Brookmeyer & Henrich, 2009; Felton & Bartoces, 2002), and inconsistent contraceptive use (More et al., 1995; Mosher & McNally, 1991). Based on these findings, some authors have stated that a greater understanding of the predictors of AFSI may be useful in developing preventive programs for adolescent pregnancy; these could be delivered prior to the beginning of adolescents' sexual lives. Specifically, this knowledge enables us to intervene and to attempt to delay sexual initiation and prevent other sexual behaviors that increase the risk of unwanted pregnancies among those adolescents at elevated risk of engaging in early sexual intercourse (O'Donnell et al., 2001; Valle et al., 2005; Wellings et al., 1999). According to Brookmeyer and Henrich (2009), initiatives designed to prevent sexual risk behaviors are more likely to be successful if they start before adolescents become sexually active.

## Ecological analysis of AFSI

The bioecological model of human development (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 1998), which has been increasingly used to understand factors related to adolescent sexual behaviors (Chase-Lansdale, Brooks-Gunn, & Paikoff, 1991; Jordahl & Lohman, 2009), constitutes the framework of the present study. This model emphasizes the vastly different contextual influences on human development and the importance of valuing their reciprocal interactions to fully understand human development. As such, it is important to take into account the characteristics of institutions such as the family, school and church, which are the principal social contexts in which human development takes place, as well as the interactions of individuals with these institutions. More distal contextual factors, such cultural and political environments in which those social institutions are nested, must also be considered (Bronfenbrenner 1979; Bronfenbrenner & Morris, 1998).

### *Biological, social, cultural, and political influences on AFSI*

Specific factors from various ecological domains have been found to predict AFSI. At the individual level, most studies have highlighted the importance of biological factors. In this field, earlier age at menarche has been associated with earlier AFSI (Jamieson & Wade, 2011; Rowe, 2002).

Regarding the principal social contexts in which human development takes place, several studies have found that family characteristics and processes are also predictors of AFSI. Concerning family characteristics, research has shown associations between early AFSI and non-nuclear, single-parent, or reconstructed family structure (Brauner-Otto & Axinn, 2010; Valle et al., 2005), lower socioeconomic status

(Paul, Fitzjohn, Herbison, & Dickson, 2000; Valle et al., 2005), and maternal history of adolescent pregnancy (Brauner-Otto & Axinn, 2010; Johnson & Tyler, 2007; Paul et al., 2000). Regarding family processes, Zimmer-Gembeck and Helfand (2007) concluded that constructs associated with early AFSI were related to family attachment (e.g., lower emotional warmth, involvement, closeness, and connectedness). This conclusion particularly emerged from studies that focused on mother-child relationships (Miller et al., 1997; Ramirez-Valles et al., 2002). According to Zimmer-Gembeck and Helfand (2007), associations between mother rejection or withdrawal of love and AFSI were not significant; parental controlling or coercive behaviors (e.g., punishment, hostility, depreciation) were significant risk factors for early AFSI only among males.

The impact that the interactions between adolescents and other social contexts, such as school and church, may have on AFSI has also been addressed. Regarding school, lower educational level, cognitive ability, and academic performance have been associated with early AFSI. As these associations have been explained by low attachment to conventional institutions, values, and goals, such as those related to school and career (Halpern, Joyner, Udry, & Suchindran, 2000; Schvaneveldt, Miller, Berry, & Lee; Wellings et al., 2001; Wheeler, 2010), school dropout is expected to have a significant impact on AFSI. Accordingly, Dorius et al. (1993) and Paul et al. (2000), for example, found that adolescents who drop out of school are more likely to engage in first sexual intercourse than their peers. Regarding religious involvement, the results are not as clear. While some studies found associations between lower religious involvement and early AFSI (Fatusi & Blum, 2008; Miller et al., 1997; Ramirez-Valles et al., 2002), others did not (Kotchick, Shaffer, Forehand, & Miller, 2001).

At the cultural level, race and ethnicity have been the most analyzed variables in AFSI research. However, the results are again unclear. While some Norwegian (Valle et al., 2005) and American studies (Jordahl & Lohman, 2009) have shown significant racial/ethnic differences in AFSI among female adolescents, other American studies have found no differences (Felton & Bartoces, 2002). Additionally, the direction of significant differences varies across studies according to the groups considered. In Portugal, the majority of the population is of European ethnic origin. Other prevalent ethnic minority groups in the context of adolescent pregnancy include African and Romani populations (Pires, Araújo Pedrosa, Carvalho, & Canavarro, 2011). Adolescents of both non-European ethnic origins tend to engage in sexual intercourse earlier than those of European ethnic origin (Allen, 2012; Gaspar, Matos, Gonçalves, Ferreira, & Linhares, 2006).

As sexual activity tends to be influenced by context-specific norms (Boislard & Poulin 2011), cultural differences between regional areas and their influences on AFSI have also been explored in several studies (Fatusi & Blum, 2008; Uthman, 2008). According to those studies, regional differences on AFSI may result from disparities regarding cultural beliefs about gender roles, family structures and religious norms, which may also vary between Portugal's islands and the mainland. In fact, women who live in the Azores Islands tend to be less educated and more frequently unemployed, and they marry and have children earlier than women living in Portugal's mainland. Religious marriages also are more common in the Azores Islands than in Portugal's mainland (INE, 2011a, 2011b, 2012). As such, the Azores Islands have been consistently associated with a lower valuation of female education, whereas traditional feminine roles, such as

motherhood, family, and housekeeping, are more highly valued. According to several authors, this may decrease the perceived costs of an adolescent pregnancy (Araújo Pedrosa, Pires, Carvalho, Canavarro, & Dattilio, 2011; Uthman, 2008; Wellings et al., 1999), leading to early AFSI (Uthman, 2008). However, it also seems reasonable to hypothesize that the more traditional gender roles, family structures and religious norms of the Azores Islands compared to Portugal's mainland may lead to delays in sexual intercourse outside of the contexts of lasting relationships or of plans to have a family and/or children (Canavarro, 2009; Fatusi & Blum, 2008).

Political conditions have been less explored in previous studies, given the methodological challenges inherent in their measurement. Considering the Portuguese context, we find that the recent change in abortion law may constitute a potential predictor of AFSI. Since 2007, the Portuguese legislation has allowed abortions on women's demand, which are offered by public health services at no cost, during the tenth gestational week. According to some authors (Adamczyk, 2008; Medoft, 2010), the proximity and accessibility of public abortion services, in conjunction with the social acceptance of abortion, may play an important role in female reproductive decisions during adolescence. Klick and Stratmann (2003), for example, concluded that legalizing abortion in the United States of America led to an increase in sexual activity and provided incentives for engaging in risky sexual activity, due to a reduction in the perceived cost of an unwanted pregnancy.

#### *Cultural influences on AFSI: Beyond the direct influences*

Despite the relevance of the results we reviewed above, there is a lack of studies addressing the cultural conditions under which the associations between identified predictors and AFSI occur. Recent comprehensive reviews in this field (e.g., Zimmer-Gembeck & Helfand 2007) show that there may be several differences between the contexts that predict AFSI among different cultural groups.

Race and ethnicity, for example, have been consistently suggested as important cultural moderators of the relationship between social institutions and AFSI (Brenda & Corwyn, 1998; Dorius et al., 1993; Zimmer-Gembeck & Helfand 2007). Concerning family processes, Brenda and Corwyn (1998) and Lauritsen (1994) found lower family attachment to be related to a greater probability of early sexual initiation among White, but not among Black, adolescents. Also, the effect of socioeconomic status on AFSI has been found only in samples limited to racial majority groups (Costa, Jesson, Donovan, & Fortenberry, 1995) or containing mostly ethnic majority adolescents (Paul et al., 2000; Valle et al., 2005). According to Dorius et al. (1993) and Zimmer-Gembeck and Helfand (2007), associations between AFSI and school dropout, lower academic goals, and school related behavior problems were also found to depend on ethnicity. While some studies have shown strong associations between those variables among ethnic majority adolescents, others concluded that these associations did not exist among ethnic minority groups (Costa et al., 1995; Dorius et al., 1993; Zimmer-Gembeck & Helfand, 2007). However, the evidence in this area is weak, and more research is needed to test the moderating effects of ethnicity. Despite the reported differences, ethnicity has rarely been examined as a moderator.

Concerning the Portuguese context, place of residence also seems to have an effect on the link between abortion legalization and AFSI. First, abortion stigma is more persistent among subcultures in which

religious norms are present and traditional family structures persist (Adamczyk, 2008), such as is the case of Azores Islands (INE, 2011a, 2011b, 2012). Second, Portuguese public abortion services are provided only in central health services. In the Azores Islands, there is only one public service providing abortion services, whereas all areas of Portugal's mainland have multiple health services providing this procedure (Direção-Geral da Saúde, 2012). As such, it seems reasonable to expect that Azores Islands present subcultural patterns characterized by lower social acceptance of abortion, less availability of reliable abortion services, and lower levels of information about this procedure than Portugal's mainland, buffering the impact of abortion legalization on AFSI.

## Conceptual and methodological issues

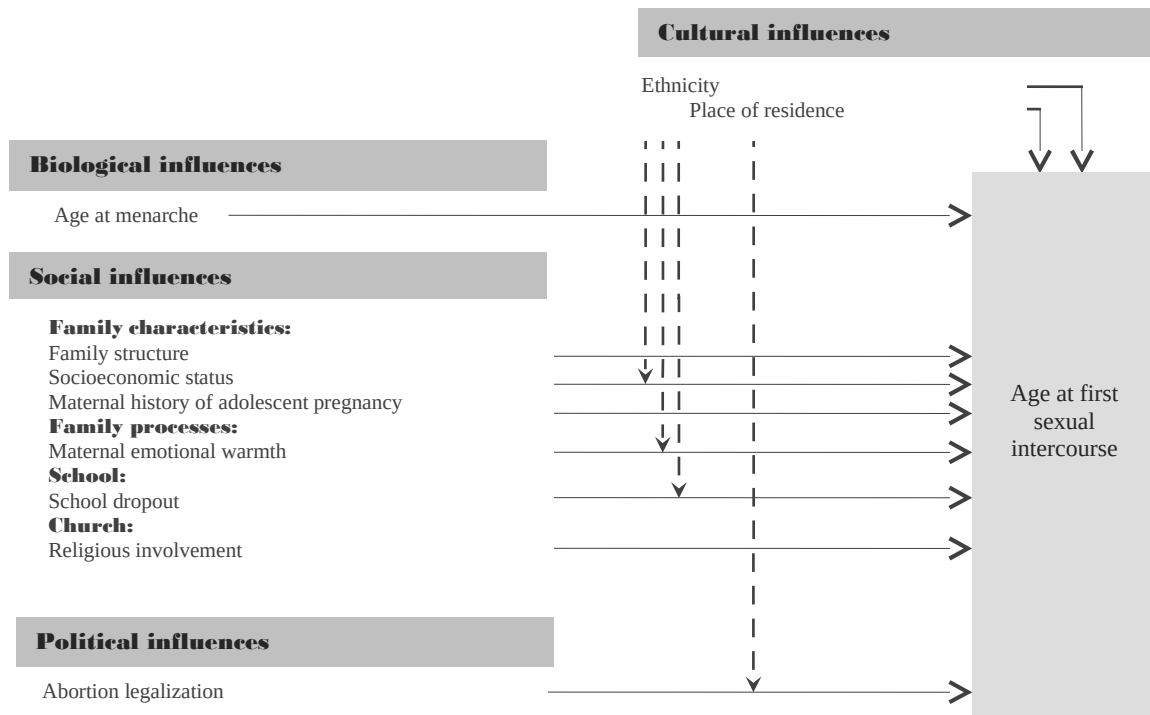
Despite the growing body of research that focuses on the predictors of AFSI, some conceptual and methodological limitations of previous research should be considered before these findings can be generalized, namely to the context of adolescent pregnancy prevention. The first of these limitations concerns the variety of indicators used to assess AFSI. Such indicators are usually based on "early/normative" dichotomizations of AFSI, assuming that the risks associated with engaging in first sexual intercourse before or after a certain age or school grade are different. However, the cut-off points chosen are not consistent across studies. Definitions of early first sexual intercourse include having engaged in sexual activity for the first time prior to age 12 (Boyce, Gallupe, & Fergus, 2008), 13 (Rafaelli & Crockett, 2003), 14 (Mott, Fondell, Hu, Kowaleski-Jones & Menaghan, 1996), 15 (Uthman, 2008), or 16 (Boislard & Poulin, 2011; Fatusi & Blum, 2008; Felton & Bartoces, 2002; Valle et al., 2005; Wellings et al., 2001), or 17 (Longmore, Manning, Giordano, & Rudolph, 2004). Some authors consider any sexual activity prior to high school graduation an early sexual initiation (Pearson et al., 2012). The authors state that first sexual intercourse after these cut-off points is a normative (and, thus, less risky) behavior. However, considering AFSI as a continuous variable (e.g. Jamieson & Wade, 2011; Ramirez-Valles et al., 2002) would allow direct comparisons across groups of different cultures and societies, as it does not depend on developmental, statistical, or legal criteria that could vary across countries.

Second, some of the previous studies on the predictors of AFSI have been conducted using samples of both males and females, without accounting for the adolescents' biological sex (Boislard & Poulin, 2011; Johnson & Tyler, 2007). However, according to several studies, AFSI follows different patterns for males and females (Fatusi & Blum, 2008; Jordahl & Lohman, 2009; Ramirez-Valles et al., 2002; Valle et al., 2005; Zimmer-Gembeck & Helfand, 2007). As such, examining the factors that lead to an increased risk for early AFSI by conducting analyses separately for males and females is indispensable to allow the generalization of results to the context of adolescent pregnancy prevention.

Finally, the majority of studies have been conducted with adolescents in high school and beyond (Pearson et al., 2012; Ramirez-Valles et al., 2002). In such cases the early-late dichotomization of AFSI tells us little about sexual initiation at non-normative young ages. Considering the predictive roles of low educational levels and early school dropout on early AFSI, as well as the bidirectional effect of earlier sexual initiation on school dropout (Schvaneveldt et al., 2001), it also may be reasonable to hypothesize that most adolescents

who engage in first sexual intercourse at very young ages are out of the range of these investigations. Furthermore, given the fact that the adolescents who become pregnant tend to initiate sexual activity and to drop out of school at earlier ages (see Araújo Pedrosa et al., 2011, for a review), conducting studies only with adolescents in high school and beyond may be unproductive for the prevention of adolescent pregnancy. Including a large range of ages and settings during sample recruitment, and recruitment outside of school contexts, could avoid these limitations.

To address these gaps, we analyzed the predictors of AFSI by considering it a continuous variable, using a national sample comprising early to late adolescent females recruited at multiple Portuguese elementary and high schools and health settings. Our first goal was to analyze the contribution of specific biological, social, cultural, and political variables to the AFSI. Our second goal was to explore the moderating effects of cultural variables on the links between social and political variables and AFSI. Figure 1 illustrates how the various predictors of AFSI fit into the ecological model adopted in the present study. Specifically, we hypothesized that earlier age at menarche, non-intact family structure, lower socioeconomic status, maternal history of adolescent pregnancy, lower maternal emotional warmth, school dropout, absence of religious involvement, belonging to ethnic minority groups, living in Azores Islands, and abortion legalization would lead to an earlier AFSI. Finally, we expected that lower socioeconomic status, lower maternal emotional warmth, and school dropout to be negatively associated with AFSI among Portuguese adolescents of European ethnic origin but not among those of non-European ethnic origin; and that the association between abortion legalization and AFSI would be stronger for adolescents living in Portugal’s mainland than for those living in the Azores Islands. In Figure 1, the solid and dotted arrows represent our first and second main hypothesis, respectively.



**Figure 1** | Hypothesized ecological model of the contributions of biological, social, cultural, and political variables to the age at first sexual intercourse.

## Method

### Participants and procedures

Study participants were 889 female adolescents who had sexual intercourse from all of the regional areas of Portugal's mainland ( $n = 618$ , 69.5%) and the Azores Islands ( $n = 271$ , 30.5%), with a mean age of 16.9 years (range: 12-19;  $SD = 1.3$ ). The adolescents were predominantly single ( $n = 630$ , 70.9%), of European ethnic origin ( $n = 839$ , 94.4%; Romani:  $n = 28$ , 3.1%; African:  $n = 22$ , 2.4%), and of low socioeconomic status ( $n = 738$ , 83.0%; medium:  $n = 129$ , 14.5%; high:  $n = 18$ , 2.0%). Five hundred and eighty-six adolescents (69.0%) were in school at the time of their first sexual intercourse. For those who had dropped out of school before first sexual intercourse, the mean grade level at the time of dropout was the 7<sup>th</sup> grade (range: 1-10;  $SD = 2.0$ ). The global mean years of education was 9.8 (range: 0-12;  $SD = 2.1$ ).

The present cross-sectional study is part of a wider project, entitled "Adolescent pregnancy in Portugal: Etiology, reproductive decision, and adjustment". The sample was surveyed between May 2008 and November 2011 at 39 public healthcare centers and 22 public schools. The institutions where the sample was collected were selected in order to reach a representative sample of the adolescent population living in each region of Portugal's mainland and Azores Islands. Specifically, the healthcare centers chosen provide central health services in its respective region. In Portugal, this means that adolescents from the whole region are usually treated and/or routinely followed in these centers. On the other hand, schools were randomly selected from the total of elementary and high schools of each region and the sample collection took place in those in which we secured permission to conduct our study. The sample collection was approved and carried out in compliance with ethical standards from all of the health and educational services research Ethics Committees where the adolescents were recruited. The eligibility criteria for inclusion were (1) being female, (2) being aged between 10 and 19 years, in congruence with the World Health Organization's definition of adolescence (1975), and (3) having the ability to understand the research questionnaires. Adolescents recruited through public health services were invited to participate during their medical appointments. Those who agreed to participate were administered an assessment during a session with a research assistant. Adolescents recruited from public educational services completed the assessment protocols in class, in the presence of a research assistant. All participants were informed about the study and provided written informed consent. When participants were under 18 years old, the consent form was also signed by their legal guardian. We used a convenience sample consisting of 1260 female adolescents who agreed to participate. From this group, we excluded 346 (27.5%) adolescents who had never engaged in sexual activity and 3 (0.2%) who did not report this information. Participants with missing values in the AFSI variable were also excluded ( $n = 22$ , 2.4%).



## Measures

### *Outcome variable*

The AFSI, which is the dependent variable in this study, was assessed with the self-report question “How old were you when you first engaged in sexual intercourse?”.

### *Biological Variables*

*Age at menarche.* Age at menarche was assessed with the self-report question “How old were you when you had your first menstrual period?”.

### *Social variables*

*Family structure.* Regarding family structure, respondents were asked to identify whom they had lived with during childhood via the self-report question “With whom did you live until you were 10 years old?”. Answers were dummy coded so that 0 = intact family (families where both biological parents lived with the child) and 1 = non-intact family (mother only; father only; other configuration).

*Maternal history of adolescent pregnancy.* One dichotomous item assessed adolescent self-report of family history of adolescent pregnancy (“Has any women in your family had a child before the age of 20?”). Those who answered “yes” were further prompted to identify the degree of relatedness with that person. For the current study, only answers concerning the mother were considered and dummy coded so that 0 = no and 1 = yes.

*Socioeconomic status.* Socioeconomic status was assessed by considering the family’s main provider (educational level and occupation) and coded according to Portuguese standard procedures (Simões, 1994); 0 = low (e.g., non-specialized workers), 1 = medium (e.g., small business owners, high school teachers), and 2 = high (e.g., governmental or private companies’ administrators, lawyers). Because the high SES category only contained 18 (2.0%) adolescents, this variable was dummy coded so that 0 = low and 1 = medium/high.

*Maternal emotional warmth.* Maternal emotional warmth was measured with the Emotional Warmth domain of the Portuguese version of the Egná Minnen av Barndoms Uppfostran Scale (EMBU, Arrindell et al., 1994; Portuguese short version by Canavarro, 1996). The EMBU is a 23-item instrument in which participants are asked to rate, separately for their mothers and their fathers, the frequency of several parental behaviors during their childhood and adolescence. Responses are given on a 5-point scale that ranges from 1 “no/never” to 4 “yes/most of the time”. Paternal and maternal behaviors are retrospectively assessed in terms of three independent factors. Emotional Warmth relates to parental behaviors of approval, encouragement, assistance, compensation, verbal and physical expressions of love, affection, and attention. In our study, the Cronbach’s alpha for Emotional Warmth (mother) was .87.

*School dropout.* One dichotomous item assessed adolescent school dropout (“Did you drop out of school?”). Those who answered “yes” were further prompted to indicate when this had occurred. According

to whether or not the adolescent had dropped out of school prior to their sexual initiation, school dropout was dummy coded as 0 = no and 1 = yes.

*Religious involvement.* One dichotomous item assessed adolescents' religious involvement ("Are you actively involved in any religion?"). Answers were dummy coded so that 0 = no, 1 = yes.

#### *Cultural variables*

*Ethnicity.* Ethnic background was assessed using self-reports and further dummy coded so that 0 = European ethnic origin and 1 = Non-European ethnic origin (African and Romani).

*Place of residence.* Place of residence was assessed using self-reports (with the question "where do you live (location)?"). Answers were dummy coded so that 0 = Portugal's mainland and 1 = Azores Islands.

#### *Political variables*

*Abortion legalization.* Abortion legalization was determined according to whether or not abortion was legal at the time of adolescents' first engagements in sexual intercourse, and this was dummy coded so that 0 = no, 1 = yes. The reference year was previously computed based on the subtraction of AFSI from age at the time of the assessment, based on the year in which the data were collected.

## Data analyses

We used the Statistical Package for the Social Sciences (SPSS), Version 17.0, to carry out all data analyses. For characterization purposes, we used descriptive statistics. Missing data on all variables were random and none of the items had more than 5% missing values. We handle missing data on maternal emotional warmth by case mean substitution (Fox-Wasylyshyn & El-Masri, 2005). In order to test associations between study variables and AFSI, we performed comparison analyses (*t* tests) and Pearson's correlations.

To address our research questions, we used hierarchical regression models. The *main effects model* tested the main effects of variables from different ecological domains on AFSI. We included the hypothesized predictors in each step of the regression model according to their biological (step 1), social (step 2), cultural (step 3), or political (step 4) natures. To test whether ethnicity moderated the links between socioeconomic status, maternal emotional warmth, school dropout and AFSI, as well as whether place of residence moderated the link between abortion legalization and AFSI, we considered four 2-way interactions that corresponded to the hypotheses (step 5, *final model*). We followed the procedures outlined by Aiken and West (1991); specifically, the continuous variable (i.e., maternal emotional warmth) was centered to reduce multicollinearity between the predictor and the interaction term, and the independent and moderating variables were introduced into the equation before the respective interaction terms. Consistent with the guidelines for testing multiple moderating effects (Frazier, Tix, & Barron, 2004), we introduced interaction

terms together in the same step of the hierarchical regression model. To determine the nature of the significant interaction effects, we used post-hoc simple slope analyses.

We presented effect-size measures for all analyses (small:  $d \geq .20$ ,  $r \geq .10$ ,  $R^2 \geq .02$ ,  $f^2 \geq .02$ ; medium:  $d \geq .50$ ,  $r \geq .30$ ,  $R^2 \geq .13$ ,  $f^2 \geq .15$ ; large:  $d \geq .80$ ,  $r \geq .50$ ,  $R^2 \geq .26$ ,  $f^2 \geq .35$ ; Cohen, 1992, Ellis, 2010), and we also performed post hoc power calculations to assess the statistical power of the regression models (G\*Power, Faul, Erdfelder, Buchner, & Lang, 2009).

## Results

### Testing associations between study variables and AFSI

The adolescents in our sample engaged in sexual intercourse for the first time between the ages of 11 to 19. The mean age of initiation was 15.2 ( $SD = 1.3$ ). *T* tests revealed significantly younger AFSI among adolescents with non-intact family structures ( $M = 14.9$ ,  $SD = 1.3$ ;  $t = -3.16$ ,  $p = .002$ ,  $d = .30$ ), maternal histories of adolescent pregnancy ( $M = 14.9$ ,  $SD = 1.4$ ;  $t = 3.43$ ,  $p = .001$ ,  $d = .30$ ), absence of religious involvement ( $M = 14.9$ ,  $SD = 1.4$ ;  $t = -4.03$ ,  $p < .001$ ,  $d = .35$ ), non-European ethnic origins ( $M = 14.7$ ,  $SD = 1.4$ ;  $t = 3.09$ ,  $p = .002$ ,  $d = .44$ ), and living in legal contexts penalizing abortion ( $M = 14.5$ ,  $SD = 1.3$ ;  $t = -9.90$ ,  $p < .001$ ,  $d = .72$ ). No significant differences in AFSI were found relating to socioeconomic status, school dropout, or place of residence. AFSI was positively associated with age at menarche ( $r = .25$ ,  $p < .001$ ) and maternal emotional warmth ( $r = .15$ ,  $p < .001$ ).

### Testing biological, social, cultural, and political influences on AFSI:

#### Main effects model

As Table 1 shows, the main effects model was significant ( $F_{10, 704} = 21.57$ ,  $p < .001$ ), explaining 23% of the variance in AFSI. Earlier age at menarche ( $p < .001$ ), non-intact family structure ( $p = .034$ ), maternal history of adolescent pregnancy ( $p = .014$ ), lower maternal emotional warmth ( $p = .001$ ), absence of religious involvement ( $p = .007$ ), belonging to non-European ethnic groups ( $p = .019$ ), and living in Portugal's mainland ( $p < .001$ ) and in legal contexts penalizing abortion ( $p < .001$ ), all significantly predicted earlier AFSI.

**Table 1** | Hierarchical regression models predicting age at first sexual intercourse: Main and interaction effects

Variables	Step 1: biological effects, $\Delta R^2 = .06$		Step 2: social effects, $\Delta R^2 = .05$		Step 3: cultural effects, $\Delta R^2 = .01$		Step 4: political effects, $\Delta R^2 = .11$		Step 5: interaction effects, $\Delta R^2 = .02$	
	$F_{(1, 713)} = 43.61^{***}$ $R^2 = .06$		$F_{(7, 707)} = 12.74^{***}$ $R^2 = .11$		$F_{(9, 705)} = 10.48^{***}$ $R^2 = .12$		Main effects model $F_{(10, 704)} = 21.57^{***}$ $R^2 = .23$		Final model $F_{(14, 700)} = 16.36^{***}$ $R^2 = .25$	
	<i>b</i> ( $\beta$ )	<i>t</i>	<i>b</i> ( $\beta$ )	<i>t</i>	<i>b</i> ( $\beta$ )	<i>t</i>	<i>b</i> ( $\beta$ )	<i>t</i>	<i>b</i> ( $\beta$ )	<i>t</i>
Constant	12.62	32.18 <sup>***</sup>	12.46	30.55 <sup>***</sup>	12.05	30.62 <sup>***</sup>	12.02	31.33 <sup>***</sup>	11.80	29.92 <sup>***</sup>
Age at menarche	0.22 (.24)	6.60 <sup>***</sup>	0.21 (.24)	6.61 <sup>***</sup>	0.21 (.23)	6.52 <sup>***</sup>	0.17 (.19)	5.56 <sup>***</sup>	0.17 (.19)	5.60 <sup>***</sup>
Family structure <sup>a</sup>			-0.27 (-.08)	-2.26*	-0.28 (-.08)	-2.30*	-0.24 (-.07)	-2.12*	-0.25 (-.07)	-2.20*
SES <sup>b</sup>			-0.07 (-.02)	-0.53	-0.07 (.02)	-0.54	-0.08 (-.02)	-0.69	-0.07 (-.02)	-0.55
Maternal HAP <sup>c</sup>			-0.31 (-.09)	-2.44 <sup>**</sup>	-0.27 (-.08)	-2.10*	-0.29 (-.08)	-2.47 <sup>**</sup>	-0.29 (-.09)	-2.48 <sup>**</sup>
MEW			-0.03 (.13)	3.59 <sup>***</sup>	0.04 (.13)	3.62 <sup>***</sup>	0.03 (.12)	3.40 <sup>**</sup>	0.03 (.11)	3.17 <sup>**d</sup>
School dropout <sup>c</sup>			0.06 (.02)	0.58	0.10 (.03)	0.87	0.20 (.07)	1.90	0.22 (.08)	2.11*
Religious involvement <sup>c</sup>			0.38 (.11)	3.06 <sup>**</sup>	0.37 (.11)	2.92 <sup>**</sup>	0.32 (.10)	2.69 <sup>**</sup>	0.27 (.08)	2.25*
Ethnicity <sup>e</sup>					-0.48 (-.08)	-2.17*	-0.48 (-.08)	-2.35*	0.24 (.04)	0.65
Place of residence <sup>f</sup>					-0.02 (-.01)	-0.17	0.49 (.18)	4.39 <sup>***</sup>	0.84 (.31)	4.58 <sup>***</sup>
Ab. Leg. <sup>c</sup>							1.14 (.40)	0.35 <sup>***</sup>	1.42 (.49)	8.98 <sup>***</sup>
Ethnicity x SES									-1.09 (-.06)	-1.57
Ethnicity x MEW									0.01 (.01)	0.27
Ethnicity x School dropout									-0.98 (-.13)	-2.05*
Place of residency x Ab. Leg.									-0.52 (-.14)	-2.38 <sup>**</sup>

Note.  $n = 714$ ;  $df = 713$ .

SES = Socioeconomic Status. HAP = history of adolescent pregnancy. MEW = Maternal emotional warmth. Ab. Leg. = Abortion legalization.

<sup>a</sup> Reference group: 0 = Intact. <sup>b</sup> Reference group: 0 = Low. <sup>c</sup> Reference group: 0 = No. <sup>d</sup> Centered variable. <sup>e</sup> Reference group: 0 = European ethnic origin. <sup>f</sup> Reference group: 0 = Portugal's mainland.

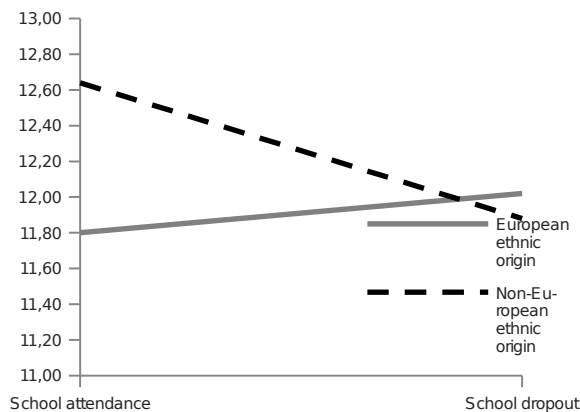
\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Post hoc power calculations demonstrated that in testing the main effects model, the achieved sample size allowed for the detection of small effects (number of predictors = 10,  $f^2 = .03$ ,  $p \leq .05$ , power = .91, G\*Power, Faul et al., 2009).

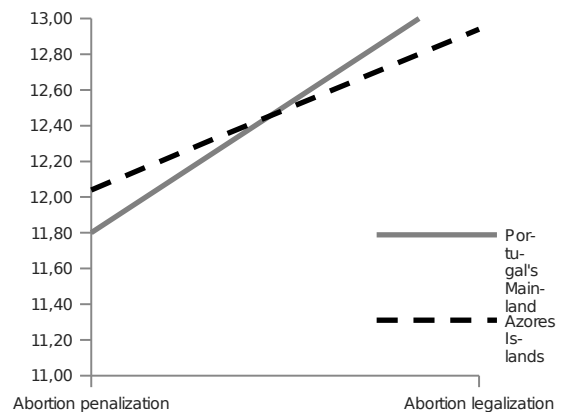
### Testing the moderating effects of ethnicity and place of residence: Final model

The final model, which includes main and interaction effects, significantly predicted AFSI ( $F_{14, 700} = 16.36$ ,  $p < .001$ ), explaining 25% of its variance. As Table 1 shows, no moderating effects of ethnicity were found regarding the influence of socioeconomic status and maternal emotional warmth on AFSI. However, the interactions between ethnicity and school dropout, as well as between place of residence and abortion legalization, were significant. All of the significant predictors in the main effects model remain significant in the current model, except for ethnicity. Post hoc power calculations demonstrated that in testing the main and interaction effects model, the achieved sample size allowed for the detection of small effects (number of predictors = 14,  $f^2 = .03$ ,  $p \leq .05$ , power = .86, G\*Power, Faul et al., 2009).

Post-hoc simple slope analyses revealed that school dropout was positively related to AFSI when adolescents were of European ethnic origin ( $b = 0.22$ ,  $p = .036$ ), and negatively, but not significantly, related to AFSI when the adolescents belonging to non-European ethnic groups ( $b = -0.76$ ,  $\beta = -.27$ ,  $t = -1.62$ ,  $p = .105$ ). In turn, abortion legalization was positively related to AFSI for adolescents in both Portugal's mainland and the Azores Islands; however, this association significantly decreased when place of residence went from Portugal's mainland ( $b = 1.42$ ,  $p < .001$ ) to the Azores Islands ( $b = 0.90$ ,  $\beta = .31$ ,  $t = 5.98$ ,  $p < .001$ ). Conditional effects for both variables are graphically represented in Figures 2 and 3.



**Figure 2** | The moderating effect of ethnicity on the association between school dropout and age at first sexual intercourse.



**Figure 3** | The moderating effect of place of residence on the association between abortion legalization and age at first sexual intercourse.

## Discussion

Overall, our results supported our two main hypotheses; all the proposed biological, social, cultural, and political variables, with the exception of socioeconomic status, had a significant influence on AFSI, and the inclusion of interaction effects that tested the moderating effects of ethnicity and place of residence on the links between social and political variables and AFSI increased the explained variance in AFSI. However, we found several unexpected results regarding the directions of predictors' influences on AFSI, which we discuss below. In short, earlier age at menarche, non-intact family structure, maternal history of adolescent pregnancy, lower maternal emotional warmth, absence of religious involvement, and living in Portugal's mainland predicted earlier AFSI. However, school dropout was found to be positively associated with AFSI among adolescents of European ethnic origin, whereas adolescents of non-European origin showed an opposite, but non-significant, pattern. A positive association between abortion legalization and AFSI was also found; this association was stronger for those adolescents living in Portugal's mainland than for those living in Azores Islands. These findings help clarify some inconsistent results of previous research on AFSI, suggesting several directions for future research and practice.

### Main biological, social, and cultural influences

Our findings were consistent with previous research implications regarding earlier age at menarche (Jamieson & Wade, 2011; Rowe, 2002), maternal history of adolescent pregnancy (Brauner-Otto & Axinn, 2010; Johnson & Tyler, 2007; Paul et al., 2000), non-intact family structure (Brauner-Otto & Axinn, 2010; Valle et al., 2005), lower maternal emotional warmth (Zimmer-Gembeck & Helfand, 2007), and absence of religious involvement (Fatusi & Blum, 2008; Miller et al., 1997), in that these were found to predict earlier AFSI.

Regarding earlier age at menarche, Zimmer-Gembeck and Helfand (2007) noted that physical maturation seems to prompt certain responses from the social environment, resulting in increased opportunities for romantic and sexual involvement, which may explain early sexual initiation. On the other hand, several authors concluded that menarche and sexual initiation share several physiological pathways that are genetically determined (e.g. Rowe, 2002).

The attitudes of adolescents and their parents about sexual behavior, such as the acceptability of sex during adolescence or before marriage, have also been associated with AFSI (Kapinus & Gorman, 2004; Zimmer-Gembeck & Helfand, 2007). Some studies suggest that younger and single or unmarried parents, namely those who cohabit with new partners, may expose their children to and teach them more favorable attitudes toward early sex and parenthood out of wedlock (Brauner-Otto & Axinn, 2010; Wildsmith, Manlove, Jekielek, Moore, & Mincieli, 2012). These findings may explain the influence of maternal history of adolescent pregnancy and non-intact family structures on AFSI among the adolescents of our sample. However, the effect of family structure on AFSI may also be explained through mechanisms of social

support, as previously hypothesized by Ramirez-Valles et al. (2002). Concerning maternal emotional warmth and religious involvement, our findings are consistent with the social development model (Catalano & Hawkins, 1995), which postulates that attachment to others and a commitment to socially approved institutions prevent adolescents from engaging in risky behaviors.

Contrary to our hypothesis, socioeconomic status was not found to be a predictor of AFSI, even when we considered the possible moderating effect of ethnicity. As noted by several authors, socioeconomic status tends to be a less significant predictor of AFSI than females' educational level (Wellings et al., 2001), family structure (Zimmer-Gembeck & Helfand, 2007), or family function (Valle et al., 2005). As such, our results may be a consequence of controlling for school involvement, family characteristics and processes, which may play important predictive roles on AFSI; they highlight the importance of valuing the interactions of different contextual influences in order to fully understand the etiology of AFSI.

Also contrary to our expectation, belonging to non-European ethnic groups did not predict earlier AFSI. Specifically, there was no main effect of ethnicity on AFSI after considering its moderating effects. According to these findings, and as previously suggested by Zimmer-Gembeck and Helfand (2007), future studies should not only investigate ethnic differences in sexual behavior, but also examine ethnicity as moderator of the associations between other potential predictors and AFSI.

Finally, our study also shows that living in Portugal's mainland was a risk factor for earlier AFSI. This finding may suggest that, although living in the Azores Islands may be a risk factor for adolescent pregnancy (Araújo Pedrosa et al., 2011; INE, 2011a, 2011b, 2012; Wellings et al., 1999), this risk may be unrelated to the effect that living in those areas may have on the AFSI. As noted by Hawes et al. (2010), AFSI is only a partial indicator of the appropriateness of sexual intercourse. The concept of sexual competence has emerged in this field; it has been operationalized using variables such as motivation, planning, intention, autonomy of decision, agreement of both partners, and contraceptive use. Accordingly, future investigations should address the full circumstances under which sexual initiation occurs, as well as the subsequent sequence of decisions and behaviors that could lead to an adolescent pregnancy. This sequence includes pregnancy intentness, contraceptive decision, and contraceptive behavior. The risk for adolescent pregnancy can reside in each of these steps and in different combinations of them, determining a multiplicity of risk trajectories that should be considered in future research on adolescent pregnancy prevention (Abma, Chandra, Mosher, Peterson, & Piccinino, 1997; Coley & Chase-Lansdale, 1998; Jones, Darroch, & Henshaw, 2002; Santelli et al., 2003). Regarding the Azores Islands relative to mainland Portugal, as hypothesized the more traditional gender roles, family structures and religiosity that characterize the islands may lead to delays in sexual intercourse outside of the contexts of lasting relationships, although, simultaneously, females' lower educational levels may compromise informed contraceptive decisions or correct contraceptive behaviors when initiations do occur and pregnancy is not intended (Commendador, 2007; Ryan, Franzetta, & Manlove, 2007). Adolescent pregnancy may also be an alternative life project to school and career for Azorean adolescents (Canavarro, 2009). These hypotheses should be considered and further investigated.

## Moderated influences of school dropout and abortion legalization

Our findings showed that adolescents of European ethnic origin who were out of school engaged in their first sexual intercourse later than those who remained in the educational system, while adolescents of non-European ethnic origin presented the opposite pattern. Although school environment should be addressed to clarify this effect (Hawes et al., 2010), it seems reasonable to hypothesize that, for adolescents of European ethnic origin, school dropout may represent a decrease in dating opportunities and thus a lower risk of engaging in sexual intercourse earlier compared to those who are in school. According to Zimmer-Gembeck and Helfand (2007), dating relationships provide the context and opportunity for sexual intercourse. These authors concluded that, depending on the measure of dating, the risk of having a history of sexual intercourse is increased between two and five times when adolescents have higher frequency of dating opportunities and behaviors. Guilamo-Ramos et al. (2009) also found that adolescents who were involved in a romantic relationship were more likely to intend to have sexual intercourse in the near future than those who were not so involved. On the other hand, adolescents of non-European ethnic origin who were out of school engaged in their first sexual intercourse earlier than those who remained in the educational system. This association, while not significant, is congruent with the greater likelihood of Portuguese African and Romani people to be living in community, compared to families of European ethnic origin (Casa-Nova, 2005; Ismael, 2008). Leaving school may not represent a significant decrease in dating opportunities and romantic involvement for adolescents of these non-European ethnic origins, which, together with the absence of academic aspirations, may lead to a decrease in the perceived cost of becoming pregnant during adolescence, increasing the probability of engaging in sexual intercourse earlier. However, future research is needed to clarify these hypotheses about the different mechanisms that may operate within different ethnic groups.

Finally, our findings also suggest a positive association between abortion legalization and AFSI, particularly among those adolescents living in Portugal's mainland. Abortion legalization in Portugal involved two national referendums and a broad discussion of arguments for and against this procedure, which were publicly disseminated at the national level and locally discussed in schools and other social institutions. This may have contributed to a greater awareness among adolescents of the risk and consequences of unwanted pregnancies, and the familial and social impacts of abortions. As such, it seems reasonable to hypothesize that the diffusion of this information may have contributed to the contradiction of the preponderance of the concrete thought (present-centered, unable to predict probabilities, and belief in immunity to natural phenomena) that characterizes this developmental stage, thus postponing sexual initiation among many. Furthermore, place of residence had a moderating effect on the link between abortion legalization and AFSI in our sample. This finding may be due to the lower social acceptance of abortion and to the lower availability of reliable abortion services in the Azores Islands than in Portugal's mainland, and, thus, to the probably lower levels of information and open reflection about this procedure in Azores Islands. Although future investigations should assess the effect of abortion legalization on AFSI more thoroughly, our findings stress the importance of including information and fostering reflection about the possible outcomes of unwanted pregnancy in sexual education programs. In the U.S., for example, both sex educators (Darroch, Landry, & Singh, 2000) and parents (National Public Radio, Kaiser Family Foundation,



& Kennedy School of Government, 2004) argue that the majority of adolescents would benefit from concrete information about abortion as well as from neutral approaches to the ethical issues involved in this procedure to prevent risky sexual behaviors.

According to these findings, in addition to isolated characteristics, factors from different ecological contexts should be considered when planning interventions aiming to foster healthy and informed transitions to sexual initiation and prevent the related risks of unwanted outcomes.

## Limitations, strengths and implications

We acknowledge some limitations to our study. Although temporal ordering and/or temporal stability are required to include predictors in our study, we used a cross-sectional design. Longitudinal designs are necessary to establish a timeline that allows for drawing causal inferences (Baltes, Reese, & Nesselrode, 1988) and should be used in future research on this topic. Additionally, despite the statistical significance of the moderating effects of ethnicity and place of residence on the links between school dropout and abortion legalization and AFSI, our findings should be interpreted carefully. First, interaction effects only account for 2% of the variance in AFSI. Second, specifically in regards to ethnicity, further research is needed to analyze the moderating effects within a sample that is representative of all ethnic groups. According to Frazier et al. (2004), when categorical moderators are not manipulated (e.g., sex, race, and ethnicity), unequal groups are likely. However, unequal sample sizes across groups decrease power, which needs to be considered when generalizing results (Arguinis, 1995).

Despite these limitations, our study provides a number of unique contributions to our understanding of the factors that influence AFSI among female adolescents. This knowledge may be useful to develop effective programs designed to prevent adolescent pregnancy prior to the beginning of adolescents' sexual lives.

Specifically, our findings enables us to fully understand the etiology of AFSI and better identify adolescents who are at elevated risk of engaging in sexual activity at earlier ages based on their biological characteristics as well as through their social, cultural, and political environments. This understanding may enable us to include them in early preventive school or community-based programs designed to delay sexual initiation and promote sexual competence, thus reducing the risk of unwanted outcomes such as adolescent pregnancy. It also allows pediatricians and other health care providers to easily identify adolescents most likely to engage in early sexual intercourse during routine appointments, in order to provide them with early education and effective family planning options. As highlighted by Miller et al. (2008), pediatricians may also be important components of sexual risk prevention efforts by providing sexual reduction risk guidance to the parents of their adolescent patients.

Finally, our study stresses the need to better understand the role that ethnicity and place of residence play on the links between social and political predictors and AFSI. It is desirable, for national preventive programs, to attend to the different patterns of risk that could lead to early AFSI among different cultural groups, tailoring preventive messages to adolescents in each one.

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