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Valéria Garcia Caputo[I]

Isabel Altenfelder Bordin[II]

Mental health problems among pregnant and non-pregnant youth

ABSTRACT

OBJECTIVE: To estimate the prevalence of mental health problems in primiparous adolescents and to compare their mental health profile with the profile of sexually active adolescents who have never gotten pregnant.

METHODS: Cross-sectional study that compared two groups of adolescents aged 13 to 17 years from a city in Southern Brazil, 2003-2004. The sample included 207 primiparous who attended prenatal care programs in urban public services, and 308 sexually active students from state public schools who had never gotten pregnant. A screening instrument to identify mental health problems in adolescents (Brazilian version of the Youth Self-Report) was applied to the participants together with a questionnaire on risk factors for pregnancy in adolescence. Statistical analysis included Chi-square tests, Fisher's exact test, Mann Whitney's U and logistic regression models.

RESULTS: Pregnant and non-pregnant adolescents did not differ in the prevalence of total mental health problems (24.6% vs. 27.3%; p=0.50). Compared to the group of never pregnant adolescents, the group of primiparous presented higher prevalence of anxious/depressive symptoms (24.2% vs. 15.3%; p=0.01) and withdrawn/depressed symptoms (13.0% vs., 4.5%; p<0.001) and there was a greater number of tobacco users (21.3% vs. 11.0%; p=0.002). These differences were confirmed by logistic regression models controlled for maternal education.

CONCLUSIONS: Anxiety and depression symptoms and tobacco use were more frequent in pregnant adolescents in comparison to non-pregnant. These problems require special attention from prenatal care services in order to avoid potential damages for the health of mothers and their children.

KEY WORDS: Pregnancy in adolescence, psychology. Adolescent psychology. Adolescent psychiatry. Mental health. Cross-sectional studies. Depression.

INTRODUCTION

In every five people in the world, one is an adolescent, with ages ranging from 10 to 19 years old, according to the World Health Organization (WHO). The world population of adolescents has surpassed 1 billion and annually, 60 in each 1000 girls in this age group, become mothers, corresponding to the birth of 17 million babies every year.*

* World Health Organization. Child and Adolescent Health and Development [internet homepage]. Geneva: 2006. Available from: http://www.who.int/child-adolescent-health [Acessed on March,18 2006]

[I] Disciplina de Psiquiatria. Faculdade de Medicina de Marília. Marília, SP, Brasil

[II] Departamento de Psiquiatria. Escola Paulista de Medicina. Universidade Federal de São Paulo. São Paulo, SP, Brasil

Correspondence:
Valéria Garcia Caputo
Núcleo de Ações em Saúde Baseadas em Evidências
Faculdade de Medicina de Marília
R. Lourival Freire, 240 – Fragata
17517-050 Marília, SP, Brasil
E-mail: vgcaputo@yahoo.com.br

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Adolescence is a stage of great psychological and physical changes and especially in Western cultures it is characterized by the passage from childhood into adult life.[17] Sexual maturity is followed by mixed emotional reactions (anxiety, fear, excitement, pleasure) and frequent mood swings, from despair to excitement. Stress level of adolescents is also increasing as society gets more complex, demanding more elaborate adaptative psychological mechanisms. Some examples are the new educational and professional demands of the current technological era, or the implications of AIDS in the sexual and emotional relationship of adolescents. They start to be involved in sexual intercourse and to establish emotional relationships gradually deeper and long lasting, what prepares them to start their own family in the future.[3] According to Aguiar,[1] sexual intercourse in adolescence may play several roles such as: relieving anguish, a way to be accepted by the partner or group, a way to compensate lack of affection, an instrument to get self-assertion, a way to rebel and an attempt to reach a greater level of independence.

In this context of sexuality, adolescence pregnancy, wanted or unwanted is important and has deserved attention by the scientific community, encouraging researches that may help giving better care to these young people. Among some of the relevant aspects is the mental health of pregnant teenagers. Some studies suggest that adolescent mothers are more likely to present mental health problems than adult mothers.[16,18] Likewise adolescents from both genders with mental health problems are more likely to become parents during adolescence than those adolescents without mental health problems.[11] In the United Kingdom, a cohort with 1116 mothers giving birth in 1994/1995, was followed-up for five years, and greater rates of mental health problems were seen both in mothers and children in the group of adolescent mothers, compared to the group of older mothers.[16]

Data on the mental health of pregnant adolescents from comparative studies with sexually active adolescents that have never gotten pregnant are rare in the literature. In Latin America and the Caribbean, most studies are based on descriptive analysis of pregnant population and when the study has a comparative group, this refers to adult pregnant women. In a broad review of the literature, we have not found studies comparing different populations of adolescents except for a master thesis that compared two independent samples of adolescents aged 13 to 17 in the town of Montes Claros-MG, Brazil: primiparous seen in prenatal public clinics and sexually active never pregnant public school students.*

The objective of the present study was to estimate the prevalence of mental health problems in primiparous adolescents, and to compare their mental health profile with those from sexually active students in the same age group that have never gotten pregnant.

METHODS

A cross-sectional comparative study was conducted in the urban region of Marília, west of the State of São Paulo, 450 km away from the capital and with a population estimated at 220,000 inhabitants.** According to the United Nation Children's Fund (Unicef) Report, in 1999, Marília was among the top 10 towns in Brazil regarding the Child Development Index (CDI) that uses health and education indicators in its calculation.*** Rate of liveborn births from adolescent mothers in the town was 16.2% in the year of 2003.**** Care of pregnant women in the public system occurs through a prenatal program in the Basic Health Care (UBS) and in the Family Health Program (USF). High risk pregnancies are followed-up in university outpatient clinics.

The study compared two independent samples of female adolescents aged 13 to 17 years: 207 primiparous, at any gestational age, recruited during 12 consecutive months in each of the UBS and USF in the city, and 308 sexually active never pregnant public school students from the eighth grade of elementary education to the senior year of high school. It is important to explain that in Marilia, public school students from this range of grades are only found in State public schools.

Among pregnant adolescents, data collection occurred from February 2003 to October 2004 through individual interviews in the health centers where they received prenatal care. All primiparous adolescents registered in public prenatal services of the urban area were identified, among them 239 met the inclusion criteria (primiparous aged 13 to 17 years, at any gestational age, undergoing prenatal care at an UBS or USF) and were invited to take part into the study. There was a 13.4% loss of eligible primiparous due to refusal (N=3), absences or leaving prenatal care for unknown reasons (N=29).

To identify subjects for the sample of sexually active adolescents who had never gotten pregnant, 12 state urban schools were considered eligible for the study

* Maia, EMGC. Características psicossociais da gravidez na adolescência na cidade de Montes Claros- MG. [dissertação de mestrado]. São Paulo: UNIFESP; 2003.
** Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2000: características da população e dos domicílios – resultados do universo. Available from: http://www.ibge.gov.br/home/estatistica/populacao/censo2000/ [Acessed on March, 18 2006]
*** United Nations Children's Fund. Situation of the Brazilian Childhood 2006 – IDI per towns. Available from: www.unicef.org/brazil/Pags 154-229 - Tabela.pdf [Acessed on January 23 2007]
**** Secretaria Municipal de Higiene e Saúde de Marília-SP. Relatório de Gestão 2003 -SMHS. Marília: 2003. Available from: http://www.famema.br/smhs/smhs2003.pdf

Table 1. Number of health unities, eligible and participant state schools according to urban regions. Marília, Southeastern Brazil, 2003-2004.

Urban region	Health unity			State school	
	UBS	USF	Participant	Eligible	Participant
North	4	5	9	4	3
South	4	2	6	5	3
East	2	1	3	1	1
West*	4	1	5	2	1
Total	14	9	23	12	8

UBS: Basic Health Unity
USF: Family Health Unity
* One unity did not present any case of teen pregnancy

according to the following criteria: having eighth grade and high school grade classrooms and being close to the prenatal health care units. One school refused to participate, and three were not approached. In the eight schools, an educational activity was carried out aiming at assuring their participation in the study to guarantee the representativeness of the four macro-regions of the city (Table 1). This activity was coordinated by a psychologist, and it consisted of watching a video about pregnancy during adolescence followed by a free discussion on the theme. Then, self-administered questionnaires were applied. The activity was inserted in the program of sexual education, which is part of the cross-sectional content of the official curriculum of the schools.

In the schools that took part in the study, 70% of the classrooms of each grade were randomly selected for the educational activity and questionnaire application. Among the total number of completed questionnaires those answered by girls over 17 years and by boys were excluded from the study. In the eight schools, of the 2,454 13- to 17-year-old girls that attended the four grades of interest for the study according to roll calls, 1,295 (52.8%) filled in the research questionnaire. Among them, 308 that were sexually active and had never gotten pregnant, formed the comparative group of the study (three adolescents had been excluded due to incomplete data regarding mental health).

Two standardized instruments were used for data collection: (1) Questionnaire on sociodemographic characteristics and risk factors for pregnancy in adolescence, developed by the researchers; and (2) The Brazilian version of the Youth Self Report (YSR),* a screening questionnaire for mental health problems in adolescents, used internationally and presenting satisfactory psychometric properties.** The YSR (version 2001) gives the behavioral profile of adolescents based on 118 items, which together in subgroups enable identifying eight syndromes (subscales): I. anxious/depressed; II. withdrawn/depressed; III. somatic complaints, IV. social problems; V. thought problems; VI. attention problems; VII. rule-breaking behavior; and VIII. aggressive behavior. Addition of the first three subscales corresponds to the internalizing behavior scale, whereas addition of the last two subscales corresponds to the externalizing behavior scale. The set of items in all subscales correspond to the "total problems scale".

The terms *internalizing* and *externalizing* are widely used in the international scientific environment, however, they do not have an exact translation into Portuguese. *Internalizing* corresponds to emotional, subjective, and hard to observe symptoms that cause suffering to individuals themselves (ex. ideas of suicide), that is, the impact is internal (symptoms directed inwards). *Externalizing* corresponds to behavioral symptoms that disturb other people (e.g. robbery, vandalism), that is, the impact is external (symptoms directed outwards). Therefore, symptoms of anxiety and depression at a clinical level (more frequent than expected for the adolescent gender and age) are considered internalizing mental health problems. On the other hand, aggressive behavior and breaking rules at a clinical level (more frequent than expected for the gender and age) are considered externalizing mental health problems.

The YSR provides raw scores that, when changed into T scores, show if the adolescent has a deviant behavior according to what is expected for his/her age and gender. Based on T score cut off points, the sample is classified into three categories: clinical, borderline and non-clinical. In the present study the cut off point considered was that correspondent to the clinical category, both for the internalizing and externalizing scales (T score≥64), and

* Abreu SR, Bordin IAS, Paula CS, Nascimento S. Inventário de Comportamentos Auto-Referidos para Jovens (Brazilian Version of the *Youth Self Report*, 2001) São Paulo: Departamento de Psiquiatria, Universidade Federal de São Paulo; 2002. [Não publicada] Os interessados poderão obter esta versão com a autora IAS Bordin, no seguinte endereço eletrônico: fbordin@dialdata.com.br
** Achenbach TM, Rescorla LA. Manual for the ASEBA school-age forms and profiles. Burlington: University of Vermont, Research Center for Children, Youth, and Families; 2001.

Table 2. Sociodemographic characteristics of pregnant (N=207) and never pregnant (N=308) adolescents. Marília, Southeastern Brazil, 2003-2004.

Sociodemographic characteristic	Pregnant N (%)	Never pregnant N (%)	p
Age (years)			
13	3 (0.6)	0 (0.0)	0.18***
14	13 (2.5)	35 (6.8)	
15	47 (9.1)	75 (14.6)	
16	72 (14.0)	103 (20.0)	
17	72 (14.0)	95 (18.4)	
Education (last grade completed)			
3	2 (1.0)	0 (0.0)	<0.001***
4	2 (1.0)	0 (0.0)	
5	13 (6.7)	0 (0.0)	
6	14 (7.2)	0 (0.0)	
7	12 (6.2)	0 (0.0)	
8	42 (21.5)	59 (19.2)	
9	42 (21.5)	97 (31.5)	
10	49 (25.1)	88 (28.6)	
11 (last high school grade in Brazil)	19 (9.5)	64 (20.8)	
Per capita income (minimum wage*)			
Up to 1	25 (4.9)	3 (0.6)	<0.001****
> 1 to 2	66 (12.8)	46 (8.9)	
> 2	44 (8.9)	59 (11.5)	
Missing**	23 (4.5)	52 (10.1)	
Marital status			
Lives or has lived with husband/boyfriend	114 (55.1)	20 (6.5)	<0.001*****
Never lived with husband/boyfriend	93 (44.9)	285 (92.1)	
Missing**	0 (0.0)	3 (1.0)	

* Minimum wage per month varied from US$66,70 to R$82.80 (2003)
** Missing were excluded from statistical analysis
*** Non-parametric Mann-Whitney U test
**** Fisher's exact test
***** Chi-square test

the eight subscales (T score≥70) of the YSR. Borderline cases were considered non-clinical.

The SPSS program, version 10.0 was used to create the database and perform statistical analysis. Univariate analysis was performed using Chi-square test, Fisher's exact test, and Mann-Whitney's U test. A 95% confidence interval (95% CI) was calculated for the odds ratio (OR). Mental health problems and isolated behaviors (YSR specific items) that presented a statistically significant difference between the two groups ($p<0.05$), were individually included in the logistic regression models, controlled for mother's education. This variable was considered as an indicator of the families' socioeconomic conditions, since the lower the socioeconomic status the greater the percentage of illiterate adult women.* Additionally, maternal education is a potential confounding factor, since in adolescence, both pregnancy and mental health problems are associated with low maternal education.[3,7] Per capita family income was excluded from the models because it was not informed by 12.6% of pregnant adolescents and 17.9% of non-pregnant ones. Logistic regression models included only independent variables not collinear to the confounding variable.

The study was approved by the Ethical Research Committee of the Universidade Federal de São Paulo

* Instituto Brasileiro de Geografia e Estatística. Síntese de indicadores sociais 2002. Rio de Janeiro; 2002. Available from: http://www.ibge.gov.br/home/estatistica/populacao/condicaodevida/indicadoresminimos/sintesedeindicsociais2002.shtm [Accessed on January 26, 2007]

(Project # 0841/03); Ethical Research Committee of the Faculdade de Medicina of Marília (Project # 173/01); and Ethical Research Committee of the Hygiene and Health Secretariat of Marília. In three schools, principals, coordinators, and/or teachers gave their written consent as being responsible for the adolescents thus, making it not necessary for parents to sign as long as the students were willing to answer the questionnaire. In the other five schools, the administration of the school sent the term to the parents, however, signatures of parents and/or teachers were accepted as long as the student wanted to take part in the survey.

RESULTS

Median age was 16 years in both groups of adolescents and the median per capita family income per month was lower among pregnant adolescents compared to non-pregnant ones (Brazilian currency: R$120,00 vs. R$200,00, p<0.001). Among pregnant girls, 107 (51.3%) were not in school and 49 of them (45.8%) had already dropped out of school for an year or over, that is, before getting pregnant. Main sociodemographic characteristics of the two groups are presented in Table 2.

According to univariate analysis (Table 3), there were no significant differences between the two groups of adolescents regarding internalizing and total problem scales, However, more non-pregnant adolescents presented externalizing behavior (20.8% *vs.* 13.0%; p<0.001) when compared to pregnant ones. Compared to non-pregnant girls, the group of primiparous girls presented higher prevalence of anxious/depressed symptoms (24.2% vs. 15.3%; p=0.01) and withdrawn/depressed symptoms (13.0% vs, 4.5%; p<0.001). In turn, non-pregnant girls presented more somatic complaints (6.5% *vs.* 0.0%; p<0.001) than pregnant ones. In addition, compared to primiparae, there was a tendency for non-pregnant girls to present higher frequency of thought problems (3.4% *vs.* 7.5%; p=0.052). Smoking was more frequent among pregnant adolescents (21.3% *vs.* 11.0%), whereas suicidal ideation (9.2% *vs.* 22.7%) and drinking without parents permission (17.4% *vs.* 45%) were more common among non-pregnant girls.

When maternal schooling was taken into account as a confounding variable in multivariate analysis (Table 4), the greater frequency of anxious/depressed symptoms (p=0.01) and withdrawn/depressed symptoms (p=0.001) among primiparae, and the greater frequency of thought problems (p=0.04) among non-pregnant

Table 3. Mental health problems in pregnant (N=207) and never pregnant (N=308) adolescents. Marília, Southeastern Brazil, 2003-2004.

Mental health problem	Pregnant N (%)	Never pregnant N (%)	OR (95% CI)	p*
YSR scales				
Internalizing behavior	71 (34.3)	88 (28.6)	1.30 (0.89;1.90)	0.17
Externalizing behavior	27 (13.0)	64 (20.8)	0.57 (0.35;0.93)	0.02
Total problems	51 (24.6)	84 (27.3)	0.87 (0.5 8;1.30)	0.50
YSR subscales				
Anxious/depressed	50 (24.2)	47 (15.3)	1.76 (1.13;2.75)	0.01
Withdrawn/depressed	27 (13.0)	14 (4.5)	3.15 (1.60;6.16)	<0.001
Somatic complaints	00 (0.0)	20 (6.5)	**	<0.001
Social problems	20 (9.7)	20 (6.5)	1.54 (0.81;2.94)	0.19
Thought problems***	07 (3.4)	23 (7.5)	0.43 (0.18;1.03)	0.052
Attention problems	18 (8.7)	19 (6.2)	1.44 (0.74;2.83)	0.29
Rule-breaking behavior	06 (2.9)	9 (2.9)	0.99 (0.35;2.82)	1.0
Aggressive behavior	10 (4.8)	16 (5.2)	0.93 (0.41;2.08)	1.0
YSR specific items				
Drinking alcohol without parents' approval	36 (17.4)	140 (45.5)	0.25 (0.16;0.38)	<0.001
Self-harm or suicide attempt	25 (12.1)	48 (15.6)	0.74 (0.44;1.25)	0.26
Suicidal ideation	19 (9.2)	70 (22.7)	0.34 (0.20;0.59)	<0.001
Smoking (tobacco)	44 (21.3)	34 (11.0)	2.17 (1.33;3.54)	0.002

YSR: Youth Self Report
* Chi-square test
** Odds ratio could not be calculated (N=0 among pregnant adolescents)
*** Signs and symptoms that indicate pathological thinking

Table 4. Logistic regression models for mental health problems (controlled for maternal schooling) in pregnant (N=207) and never pregnant (N=308) adolescents. Marilia, Southeastern Brazil, 2003-2004.

Logistic regression model*	OR (95% CI)	p
Externalizing behavior	0.62 (0.37;1.04)	0.07
Anxious/depressed	1.80 (1.13;2.88)	0.01
Withdrawn/depressed	3.41 (1.68;6.91)	0.001
Somatic complaints	**	0.38
Thought problems***	0.39 (0.16;0.94)	0.04
Suicidal ideation	0.33 (0.18;0.58)	<0.001
Smoking (tobacco)	2.16 (1.28;3.63)	0.004

* The variable drinking alcohol without parents' approval could not be assessed through a logistic regression model, since it was collinear with maternal schooling
** Odds ratio could not be assessed (N=0 among pregnant adolescents)
*** Signs and symptoms that indicate pathological thinking

girls were confirmed. Smoking remained more frequent among pregnant girls (p=0.004), whereas only suicidal ideation remained more frequent among non-pregnant girls (p<0.001). The variable drinking alcoholic beverage without parents consent could not be assessed in a logistic regression model since it was collinear with the variable maternal schooling.

DISCUSSION

The present study presents relevant information for more appropriate care of pregnant adolescents, that can be useful for planning public health and adolescent mental health actions at a regional level. It is the second Brazilian study that included a comparative group of sexually active never pregnant adolescents to study the mental health profile of pregnant girls. Although, with the advantage of using a more detailed screening instrument that has been used for over 20 years and that is an international reference for the assessment of adolescent mental health.

However, some methodological limitations have to be considered such as the difference in procedures in the application of questionnaires for the two groups of adolescents and the four schools that did not participate in the study among the 12 eligible state schools. Applying the questionnaire through an interview was necessary for the pregnant group due to the low educational level of some girls, what would certainly impair data collection through the use of a self-applied instrument. On the other hand, individually interviewing more than 1,000 girls in schools would be unfeasible since it would interfere with daily school activities for a long period of time. Although the ideal sample of never pregnant girls should include students from all eligible schools, the actual sample represents the four macro-regions of Marília (Table 1). Non-participant schools are not different from participant ones either regarding the academic program of grades of interest for the study or the socioeconomic status of students, but no statistical tests to prove this statement were carried out.

The questionnaire used to assess the mental health of adolescents was developed to be self-administered in youth with no significant school delay. However, cut-off points used to determine the clinical range of T scores obtained from YSR scales and subscales were established according to American normative data since Brazilian normative data are still lacking.

Concerning the mental health profile of pregnant adolescents, several studies suggest that juvenile delinquency is associated with early pregnancy.[6,8] Hope et al[9] carried out a study to assess relationship among adolescent pregnancy, pregnancy resolution and juvenile delinquency. The authors studied a sample from the National Longitudinal Study of Adolescent Health and verified that adolescents who got pregnant obtained higher scores for juvenile delinquency than those never pregnant (0.36 *vs.* 0.2; p<0.001). However, when forms of pregnancy resolution were individually assessed it was noticed that this difference occurred due to adolescents that decided for abortion (0.65 *vs.* 0.2; p<0.001) or for giving their babies for adoption (3.68 *vs.* 0.2; p<0.001). Girls who kept their babies had similar delinquency scores of those who had never gotten pregnant. We consider that this group of girls is similar to the group of primiparous from our study in terms of choice for maternity, independent of socioeconomic and cultural differences. In our study, no significant differences were found between the two groups of adolescents regarding rule-breaking behavior, aggressive behavior and externalizing behavior.

Wiemann et al[20] compared two groups of adolescents (<18 years of age) from the lower socioeconomic strata of the American population that used public health services: 185 primiparous assisted at prenatal services, and 126 never pregnant adolescents participants of family planning programs. However, no information on sexual activity was available for the group of never pregnant girls. Regarding mental health problems, identified by the YSR, never pregnant adolescents presented higher rates of delinquent behavior, when compared to pregnant ones (28.6% *vs*. 7.1%; p<0.001). Compared to the present study, Wiemann et al[20] used an older version of the YSR, included borderline cases in the clinical category and did not use multivariate analysis to evaluate the influence of confounding factors, which might explain differences found in results.

In Brazil, high rates of anxiety (23.3%), depression (20.8%) and suicidal ideation (16.7%), were found in a random sample of 120 pregnant adolescents (14-18

years) referred to a health center in the city of Piracicaba-SP.[5] In a population-based study conducted in a low-income neighborhood of the city of Embu-SP (n=813, both genders, 0-17 years), lower rates of anxious/depressed symptoms (7.4%), withdrawn/depressed symptoms (2.1%) and tobacco use (5.4%) were found among 13- to-17-year-old girls (N=92), using the YSR.* As expected, our results are closer to those obtained in the sample of pregnant adolescents seen in public health services than from the populational study. Nevertheless, the study of Freitas et al[5] used different instruments to classify psychopathology and it was conducted with three cross-sectional samples of adolescents (40 for each trimester of pregnancy).

In the city of Montes Claros (Southeastern Brazil), a study on pregnancy in the age range 13 to 17 years was conducted, with a methodology similar to the one from this study. Primiparous (N=196) presented more symptoms of anxiety and/or depression than sexually active never pregnant girlsgirls (56.6% *vs.* 43.2%; OR=1.7; CI 95%: 1.1–2.6; p=0.01).** The anxiety/depression rate among pregnant adolescents from Montes Claros was two times higher than the rate obtained among pregnant girls of the present study. This difference may be due to the fact that the other study used another screening instrument to identify mental health problems in adolescents (Strengths and Difficulties Questionnaire – SDQ),[4] including borderline cases in the clinical category. However, both studies showed higher frequency of anxiety and/or depression symptoms in the pregnant group compared to the never pregnant group.

Despite the expected anxiety and/or depression due to an unexpected pregnancy together with emotional immaturity of many adolescents to handle pregnancy, it is reasonable to question if these teen mothers did not present these symptoms before getting pregnant. Surveys in the 90's evaluated mental health problems during childhood as predictive factors of pregnancy in adolescence.[12,21] One of these studies conducted in Pittsburgh (USA)[12] followed-up a sample of 83 girls aged 8 to 13 years referred to a child psychiatry clinic or health service. The objective was to verify if depressive disorders and/or conduct disorders in childhood or adolescence would increase the risk of pregnancy before 19 years of age. Multivariate analysis showed that only conduct disorders and belonging to the African-American ethnic group were associated with pregnancy during adolescence. In the present research, conclusions on causality are not possible since cross-sectional studies can not establish sequence in time between the studied factors. Additionally, comparability of results is limited by differences in sample selection, since in the mentioned study, adolescents had been referred to a child psychiatry clinic or health service, whereas the present research evaluated prenatal service clientele and students.

Regarding smoking, a comparative study carried out in Taiwan[19] with 122 pregnant adolescents, and 196 sexually active never pregnant girls, reported rates of tobacco use of 36.9% and 27% respectively, with no statistically significant difference.[19] As this study used a methodology similar to ours, the absence of association between smoking and pregnancy may be explained by differences in socioenvironmental characteristics, since the Thai study was not restricted to a low-income population. In Pelotas (Southern Brazil), a cohort study with a systematic sample of 473 female adolescents of up to 19 years of age,[15] showed that belonging to low-income families was one of the risk factors for the habit of smoking. A cross-sectional study carried out with 5,539 pregnant youth older than 20 years, seen in prenatal outpatient clinics from public hospitals of six capitals of Brazilian States, reported an association between smoking and low schooling of pregnant patients (less than nine years of schooling).[13] Since low maternal schooling may be considered a marker of low income related to several unfavorable psychosocial characteristics,[14] one may hypothesize that adolescents living in disadvantaged conditions may not have been aware enough of the harms of smoking together with the possibility of a smoking mother being a model for adolescent daughters.

Considering the present study's findings, attention to pregnant adolescents by specific prenatal care programs is justified, including attention to mental health, and interventions to prevent and stop smoking in order to eliminate or reduce possible harms to the health of mothers and their children.

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