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Motherhood in early adolescence: a case-control study in Southern Brazil

Maternidade na adolescência inicial: estudo caso-controle no sul do Brasil

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Abstract *This paper investigates factors associated with motherhood among adolescents from 14 to 16 years of age in Porto Alegre, Brazil. This is a case-control study with 431 adolescent mothers (cases) and 862 adolescents who had never given birth (controls). Data were obtained through home visits by an interviewer-applied questionnaire. Sociodemographic characteristics, quality of social and family relationships, lifestyle and history of abuse were studied as potential determinants to early adolescent motherhood. Conditional logistic regression was used for data analysis according to a two-stage hierarchical model. Results showed that lower economic class, schooling failure, tobacco consumption, alcoholic drunkenness at least once in life and having a mother who gave birth before 20 years of age were positively associated with early adolescent motherhood. Later menarche and having relatives or having friends in whom to trust remained as protective factors. Schooling failure, which obtained the highest risk, points to the important role of the school in this population's development and its potential to stimulate healthy life habits.*

Key words *Adolescent, Motherhood, Case-control study*

Resumo *Este artigo visa investigar fatores associados à maternidade em adolescentes moradoras em Porto Alegre, com idade entre 14 e 16 anos. Estudo caso-controle com 431 mães adolescentes (casos) e 862 adolescentes que nunca tiveram filho (controles). Os dados foram obtidos através de visitas domiciliares e mediante aplicação de questionário estruturado. Foram estudadas variáveis sociodemográficas, qualidade das relações sociais e familiares, estilo de vida e histórico de abuso como possíveis determinantes da maternidade na adolescência. Os dados foram analisados através de regressão logística condicional, utilizando modelo hierarquizado. Os resultados mostram que pertencer aos estratos socioeconômicos mais baixos, possuir mãe que teve o seu primeiro filho até os 19 anos, defasagem escolar, uso de tabaco e embriaguez alcóolica pelo menos uma vez na vida foram positivamente associados à maternidade na adolescência. Menarca mais tardia e ter familiares ou ter amigos em quem confiar foram fatores de proteção. Defasagem escolar, que obteve razão de odds mais elevada, aponta o importante papel da escola na formação desta população e no seu potencial para estimular hábitos de vida sadios.*

Palavras-chave *Adolescente, Maternidade, Estudo de caso-controle*

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Introduction

The World Health Organization estimates that about 16 million adolescents aged 15 to 19 years and 1 million girls under 15 years of age give birth each year, accounting for about 11% of all births worldwide. According to the World Health Statistics 2014, the global average birth rate for adolescents aged 15 to 19 is 49 per 1000 girls, with the vast majority of these births (95%) occurring in low- and middle-income countries. The rate per country ranges from 1 to 299 births per 1000 girls, with higher rates in the sub-Saharan Africa[1].

Globally, birth rates among teenagers have been declining markedly since 1990. In Brazil, the proportion of adolescent mothers' live births went from 20.71% in 2003 to 18.41% in 2011, the latter being distributed as 0.77% for mothers under 15 years of age and 17.64% for mothers aged 15 to 19 years[2]. However, despite these indicators, teenage pregnancy remains one of the main risk factor associated with maternal and infant mortality, and with the health-disease and poverty cycle[3].

Several factors contribute to adolescent pregnancy, which presents itself as a complex social phenomenon. Among them, poverty stands out, contributing both as cause and as effect, since the rates of adolescent pregnancy are negatively associated with income and schooling[4]. As a result, these adolescents have less information about sexuality and reproduction; lack of knowledge about contraceptive methods and greater difficulty in accessing them. Other risk factors include being the child of an adolescent mother, early sexual initiation, being raised by someone other than both parents, excessive alcohol consumption, community violence, and poor physical environment[5-8].

Several indicators show the severity of adolescent pregnancy. Complications during gestation and childbirth are the second leading cause of death among 15 to 19 year olds worldwide. These teenagers are twice as likely to die during pregnancy, childbirth and puerperium when compared to women at 20 years of age or older, and this likelihood increases by up to five times when comparing pregnant women under 15 with those above 20 years of age[4]. In addition, as a consequence of unwanted pregnancies, approximately 3 million unsafe abortions happen each year among girls aged 15 to 19, contributing to maternal mortality and to chronic health problems[1]. In Brazil, young, black, poor women residents of peri-urban areas are the most affected by maternal deaths caused by abortion[9].

Besides the high morbidity and mortality rates of adolescent mothers, other negative health consequences occur, in special the child's prematurity, low birth weight and increased vulnerability to abuse. In low- and middle-income countries, children born to mothers under the age of 20 have a 50% higher risk of dying during childbirth or in the first weeks of life compared to those born to mothers aged 20-29 years[1].

Adolescent motherhood has an unfavourable social and economic impact for the teenager, as well as for her family and community. These adolescents drop out of school, often before pregnancy, decreasing the possibility of future work and fostering economic dependence which, among other causes, maintains intergenerational transmission of poverty[3].

This paper aims to investigate factors associated with motherhood in adolescents between 14 and 16 years of age from Southern Brazil.

Methods

This is a multidisciplinary case-control study. Cases were adolescent girls with 14 to 16 year of age, living in Porto Alegre, Brazil, who gave birth in 2009. Two neighborhood controls were chosen for each case, which consisted of the adolescent of 14 to 16 years of age and without child living in the next housing to the left and to the right of the case[10].

Cases were identified through the Brazilian Information System on Live Births (SINASC). A sample of the SINASC/Porto Alegre total adolescents mothers in 2009 was drawn, with an estimation number of 425 adolescents based on the SINASC data from the previous year. Considering the size of the sample to be investigated (425 cases and 850 controls), 95% confidence level and the estimated prevalence of exposure among controls of 20%, this study was able to detect odds ratios greater than or equal to 1.5.

Data were collected at the adolescents' homes through an interviewer-applied questionnaire specially designed for this purpose and based on a literature review and other studies on adolescent sexuality[6,11]. Data on economic classification were obtained through the Criteria of Economic Classification of the Brazilian Association of Economic Research (ABEP)[12], which estimates the purchasing power of urban individuals and families and takes into account the head of the

household's educational level. This economic classification has a decreasing rank from A to E.

Data collection lasted from July 2009 to May 2010 and was performed by female university students enrolled in the health sciences who received training and weekly follow up during meetings with the project team. All eligible cases were sought for up to three home visits. When not found, they were replaced by next case from the SINASC/Porto Alegre list until the sample was completed. The Informed Consent Form was signed by the adolescent's guardian or by the emancipated adolescents prior to the interview. The interviewee was also given the option to refuse her participation.

Quality control of the interviews was made through random telephone contacts to 10% of the studied sample in which some questions were asked again and the truthfulness of the answers was verified. Before starting the data collection, a pilot study was performed with eleven adolescent mothers and their controls, other than those included in the sample, for interview and logistics adequacy.

The database was processed by TELEform system (Autonomy Inc., San Francisco, USA). This software replaces manual data entry with an automatic scanning of the questionnaire forms and later migration of the data to the statistical package SPSS 18.0 (SPSS Inc., Chicago, USA). Sociodemographic variables (economic classification, self-reported skin color, raised by the biological mother, mother`s educational level, mother's age at first childbirth, age at menarche, number of residents at home); quality of social and family relationships (person to trust, relationship with mother and with father, relationship between parents); lifestyle and history of abuse (schooling failure, practice of religion, tobacco consumption, alcoholic drunkenness, use of illicit drugs , use of illicit drugs by a relative, physical and sexual abuse) were studied as potential determinants of early adolescent motherhood, based on previous studies on adolescent health[6,7,10,11]. Person to trust was categorized as none, relatives (parents and extended family) or friends. Schooling failure was considered as grade retention or school dropout. For adolescent mothers, this variable concerned the period before pregnancy.

Conditional logistic regression was used to determine which factors were associated with adolescent motherhood. Crude odds ratios were used to describe the relationship between each predictor and the outcome. Adjusted analysis of the determinants associated with adolescent motherhood was accomplished through a two-stage hierarchical model based on social determination of health[13,14] (Figure 1). This approach, based on statistical associations and on a conceptual framework, takes into account the effect of a factor after controlling for confounders variables from the same and higher level of the hierarchical model.

Most of the variables were categorized for the design of the multivariate model, being established, in advance, the reference category for risk estimation. All variables that had a $p \leq 0.20$ were included in the next level of the analysis. The variables of the second level were adjusted for others in the same or higher level of the hierarchical model. The significance level adopted for the final model was $p < 0.05$.

This research was presented in compliance to Resolution 196/9616 of the National Health Council/Ministry of Health and approved by the Ethics Committee of the Lutheran University of Brazil and by the Municipal Health Department of Porto Alegre. It was performed with funding from the National Council for Scientific and Technological Development (CNPq).

Results

A total of 431 cases and 862 controls were interviewed. Five controls were excluded because they did not provide consistent information. Hence, five cases had only one control. The final sample consisted of 431 cases and 857 controls, in a total of 1.288 adolescents studied.

Table 1 shows the crude and adjusted odds ratios of the studied variables in the first hierarchical level. No significant differences were found between cases and controls for self-reported skin color, educational level of the adolescent mother and number of residents at home in the bivariate analysis. Those adolescents belonging to the poorest socioeconomic strata and having a mother who had her first child during her teenage years (up to the age of 19) were in higher risk for motherhood, while late menarche was a protective factor. Not being raised by the biological mother was a risk factor in the bivariate analysis, but it lost significance when adjusted for confounding factors. Schooling of the adolescent mother, although inserted in the multivariate analysis, was not statistically significant. The other variables of the first hierarchic level (self-reported skin color and number of dwellers in the household) had no association on early adolescent motherhood.

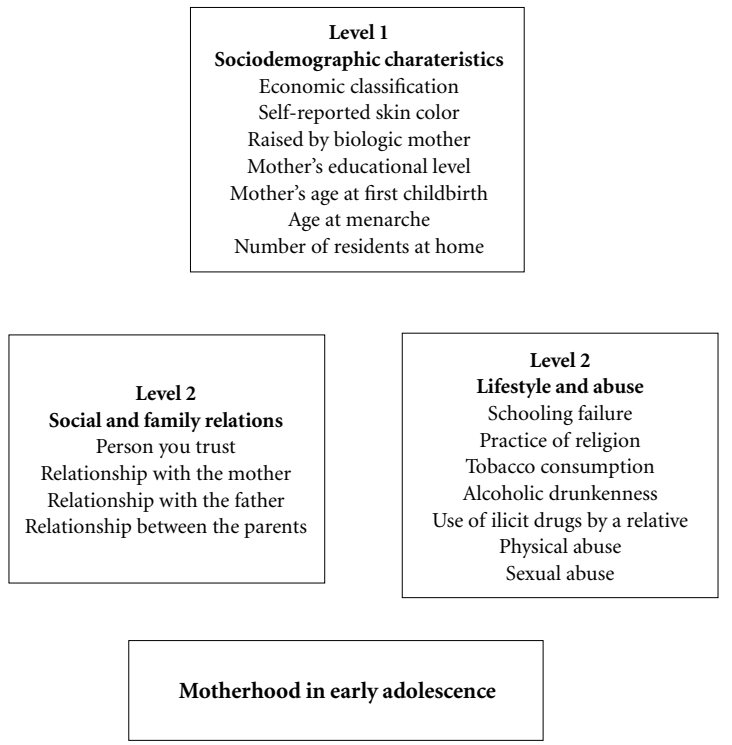

Figure 1. Hierarchical model of the determinants associated with motherhood in early adolescence, Porto Alegre, Brazil.

All the variables of the second hierarchical level, except for the relationship with the mother, were inserted in the multivariate analysis (Table 2). Protective factor for adolescent motherhood was to report family and friends who could trust in, while schooling failure, tobacco consumption and alcohol drunkenness at least once in life were identified as risk factors. Illicit drug use, physical abuse, not practicing religion, poor relationship with the father, and poor relationship between parents were risk factors for adolescent motherhood in the bivariate analysis but lost significance when adjusted for variables of the same hierarchical level and of the higher level.

Table 3 presents variables that remained in the final model of the conditional multivariate analysis ($p < 0.05$). Low socioeconomic classification was a risk factor for motherhood in early adolescence. Those who were identified as belonging to socioeconomic strata D or E increased by 1.86 times the chance for motherhood compared to A/B strata (CI95%: 1.05-3.29). Similarly, having a mother who had her first child also during adolescence increased the chances for early adolescent motherhood by 1.48 (CI95%: 1.10-2.00). A later menarche was a protection factor with adjusted odds ratio of 0.89 (CI95%: 0.79-0.99).

Adolescents who reported that have relatives and friends in whom to trust remained as protective factors accounting for, respectively, 40% (CI95%: 0.26-0.65) and 47% (CI95%: 0.28-0.77) less chance for motherhood, in comparison with adolescents who reported no one to trust. Schooling failure increased the chance for motherhood by 5.18 (CI95%: 3.27-8.19), as well as tobacco consumption and alcohol drunkenness at least once in life (OR: 1.90, CI95%: 1.37-2.64, OR: 1.61, CI 95%: 1.14-2.27, respectively).

Discussion

The study points out some sociodemographic, lifestyle and social relationships variables as risk

Table 1. Crude and adjusted odds ratio (OR) for early adolescent motherhood according to sociodemographic characteristics, Porto Alegre, Brazil.

Variables	Case (%)	Control (%)	Crude analysis			Adjusted analysis[a]		
	(n=431)	(n=857)	OR	(CI95%)	*p*	OR	(CI95%)	*p*
Economic classification								
A/B	9.7	13.4	1			1		
C	57.4	69.3	1.26	(0.86-1.94)	0.300	1.30	(0.80-2.09)	0.287
D/E	32.9	17.3	3.05	(1.86-5.00)	0.000	3.12	(1.80-5.44)	0.000
Self-reported skin color								
White	47.8	48.7	1					
Not white	52.2	51.3	1.04	(0.82-1.33)	0.741			
Raised by the biological mother								
Yes	88.6	92.8	1			1		
No	11.4	7.2	1.64	(1.10-2.44)	0.015	1.39	(0.86-2.27)	0.180
Mother's educational level								
High school or more	13.0	16.0	1			1		
Less than high school	22.8	22.5	1.35	(0.89-2.05)	0.155	1.05	(0.68-1.64)	0.821
Less than primary school	64.2	61.5	1.38	(0.94-2.03)	0.100	1.09	(0.68-1.76)	0.712
Mother's age at first childbirth								
>19 years	35,0	45.6	1			1		
≤ 19 years	65,0	54.4	1.57	(1.23-2.00)	0.000	1.80	(1.35-2.41)	0.000
	M (SD)	M (SD)						
Age at menarche (years)	11.8 (1.2)	12.0 (1.3)	0.87	(0.76-0.96)	0.004	0.88	(0.79-0.98)	0.026
Number of residents at home	4.1 (2.1)	4.2 (1.9)	0.99	(0.93-1.05)	0.715			

[a] Adjusted for significant variables (p<0,20 in the bivariate analysis) according to hierarchical model (Figure 1); variables were adjusted for others in the same level by conditional logistic regression. CI95%: confidence interval of 95%, M: mean, SD: standard deviation.

factors for early adolescent motherhood and schooling failure had the greatest association.

School attendance is considered one of the most important factors for the overall health of adolescents. The literature considers both school delay and dropout as risk for early motherhood[15,16]. Some studies show that girls who remain in school have greater access to health information, are less likely to engage in sexual activity and become pregnant, and if they have sex, they use contraceptive methods more consistently[17].

Data from the United States National Longitudinal Survey of Youth indicate that slightly more than half of the young American women who had been adolescent mothers completed high school at the age of 22, compared with the 89% of young women who had not given birth during adolescence. In addition, young women who had a child before the age of 18 were less likely to complete high school than those who had a child at 18 or 19 years old. Considering that adolescent mothers are more likely to present problems at school even before pregnancy, school failure is considered a risk factor not only for early motherhood, but also for the subsequent acquisition of jobs and adequate remuneration, generating a cycle of negative outcomes in the teenager's life[18]. Accordingly, the present study showed that the schooling failure, in the period prior to pregnancy, was associated with a higher risk of early adolescent motherhood for young female in Southern Brazil.

Economic inequality is seen as one of the three most important structural factors influencing the overall health of adolescents, along with access to education and health[19]. Although most of the studies investigating economic inequality and adolescent fertility are conducted in developed countries, Chiavegatto Filho and Kawachi[20]

Table 2. Crude and adjusted odds ratio (OR) for early adolescent motherhood according to social and family relations, lifestyle and abuse, Porto Alegre, Brazil.

Variables	Case (%)	Control (%)	Crude analysis			Adjusted analysis[a]		
	(n=431)	(n=857)	OR	(CI95%)	p	OR	(CI95%)	p
Person to trust								
No one	17.9	8.5	1			1		
Relatives	47.2	59.2	0.36	(0.25-0.53)	0.000	0.39	(0.23-0.63)	0.000
Friends	34.9	32.3	0.49	(0.33-0.73)	0.000	0.46	(0.27-0.77)	0.003
Relationship with mother								
Good	78.9	79,0	1					
Bad	21.1	21,0	1.02	(0.77-1.36)	0.903			
Relationship with father								
Good	50.9	60.4	1			1		
Bad	49.1	39.6	1.48	(1.17-1.87)	0.001	1.13	(0.82-1.55)	0.457
Relationship between parents								
Good	50.8	62.4	1			1		
Bad	49.2	37.6	1.67	(1.31-2.13)	0.000	1.20	(0.87-1.66)	0.271
Schooling failure								
No	9.5	33.6	1			1		
Yes	90.5	66.4	5.52	(3.77-8.07)	0.000	4.96	(3.12-7.89)	0.000
Practice of religion								
Yes	65.3	71.5	1			1		
No	34.7	28.5	1.35	(1.05-1.74)	0.020	1.09	(0.79-1.53)	0.595
Tobacco consumption								
No	46.5	67.3	1			1		
Yes	53.5	32.7	2.47	(1.92-3.18)	0.000	1.78	(1.27-2.51)	0.001
Alcoholic drunkenness								
No	62.2	78.3	1			1		
Yes	37.8	21.7	2.21	(1.70-2.86)	0.000	1.53	(1.07-2.19)	0.019
Use of illicit drugs								
No	92.3	96.8	1			1		
Yes	7.7	3.2	2.56	(1.51-4.36)	0.001	1.45	(0.70-3.01)	0.323
Use of illicit drugs by a relative								
No	63.5	67.6	1			1		
Yes	36.5	32.4	1.2	(0.94-1.54)	0.148	0.85	(0.61-1.18)	0.322
Physical abuse								
No	86,0	90.7	1			1		
Yes	14,0	9.3	1.61	(1.12-2.32)	0.011	0.97	(0.59-1.60)	0.904
Sexual abuse								
No	93.5	95.3	1			1		
Yes	6.5	4.7	1.41	(0.87-2.31)	0.167	1.42	(0.71-2.88)	0.324

[a] Adjusted for significant variables (p<0,20 in the bivariate analysis) according to hierarchical model (Figure 1); variables were adjusted for others in the same or higher level by conditional logistic regression. CI95%: confidence interval of 95%, M: mean, SD: standard deviation.

have demonstrated that, from 2000 to 2010, economic inequality had a consistent and positive association with fertility in adolescents in more than 5.000 municipalities in Brazil[20]. In the present study, economic classification was one of the variables that remained associated with motherhood in early adolescence, even within a design of cases and community (neighborhood) controls, in which similar conditions of purchase power and housing were assumed.

Table 3. Final determination model for early adolescent motherhood in the case- control study, Porto Alegre, Brazil.

Variables	Adjusted[a] OR	(CI95%)	p-value
Level 1			
Economic classification			
A/B	1		
C	0.99	(0.60-1.65)	0.987
D/E	1.86	(1.05-3.29)	0.033
Mother's age at first childbirth			
>19 years	1		
≤19 years	1.48	(1.10-2.00)	0.010
Age at menarche (years)	0.89	(0.79-0.99)	0.040
Level 2			
Person to trust			
No one	1		
Relatives	0.40	(0.26-0.65)	0.000
Friends	0.47	(0.28-0.77)	0.003
Schooling failure			
No	1		
Yes	5.18	(3.27-8.19)	0.000
Tobacco consumption			
No	1		
Yes	1.90	(1.37-2.64)	0.000
Alcoholic drunkenness			
No	1		
Yes	1.61	(1.14-2.27)	0.007

[a] Adjusted analysis according to hierarchical model (Figure 1); variables were adjusted for others in the same or higher level of the hierarchical model by conditional logistic regression, excluding those with p ≥ 0,05 after adjustment. OR: odds ratio, CI95%: confidence interval of 95%.

Unhealthy lifestyles, such as tobacco and alcohol consumption, appeared early in the adolescents studied and were associated with motherhood. Some authors point out the importance of understanding adolescent motherhood in the light of theories which take contextual factors into account[20]. According to these theories, adolescents who face an unequal and segregating society become unmotivated to invest in their own human capital, triggering what is known as the "culture of despair"[20]. The use of alcohol and drugs can be examples of this context.

Another contextual aspect of importance for the determination of early adolescent motherhood concerns the social support network. Having relatives (in which includes parents and extended family) or friends to trust was a protective factor for motherhood in the present study, when compared to having no one to trust. Social isolationism is atypical in adolescence, a stage characterized by group identification, and can indicate relational problems. In the same way, the family, as a basis for the establishment of social bonds, continues to play an important role for teenagers, even if they naturally move away from family ties and strengthen their friendship bonds[21]. Although the literature pointed out an unstable family structure as a risk factor for early sexual initiation in adolescents and for motherhood[22], the present study was not able to detect such effect. This result maybe implies that trusting not only on parents but, specially, on extended family had contributed for the protective effect on adolescent motherhood.

In the present study, mothers who had children during adolescence increased the chances of their daughters becoming early teenage mothers by one and half times, showing the intergenerational aspect of fertility transmission. Intergenerational fertility correlations can be found with relative consistency in developed countries and appear to increase over time[23]. In developing countries, more research is needed in this regard.

A prospective cohort study, conducted in the city of Ribeirão Preto, in the São Paulo state, with 1059 pairs of mothers and daughters, showed the independent effect of adolescent motherhood from one generation to the next generation after adjusting for socioeconomic and biological factors[24]. More recently, Wall-Wieler et al.[8], using a population database in Canada, also showed an odds ratio of 1.57 times higher of pregnancy for teenage daughters of women who had their first child before age 20 over those whose mothers had their first child after the age of 19. It should be noted that cultural and behavioural variables, considered important in the transmission of fertility from parents to offspring, were not included in the mentioned studies. It is possible that daughters of women who became pregnant during adolescence consider pregnancy at this stage less dangerous than the general population and, therefore, use less prevention. Some studies have shown that pregnancy was desired for many of these adolescents[25] and was not considered a negative experience for most of them[26].

Finally, the age at menarche was analysed as a possible biological factor associated to mo-

therhood. Indeed, adolescent mothers of the present study had an earlier menarche than controls, although the difference was very small. Early menarche means the early development of secondary sexual characteristics and reproductive capacity, which may favour the early starting of sexual activity. The association between adolescent motherhood and early menarche was also found by Ferraro et al.[24] in a cohort study conducted in Ribeirão Preto.

It should also be noted that variables such as self-reported skin color, religious practice and abuse, although described in the literature as possible predictors for motherhood in adolescence[6,11,27], were not associated with this outcome in the present study. As the distribution of these variables were similar in cases and controls, our sample probably did not have the power to detect such associations.

As a limitation of the study, it is possible to mention the need for replacement of adolescent mothers (cases) not drawn to compose the sample, since many drawn addresses were not found despite having been searched up to three times. However, in case-control studies, more important is to have representative controls from the cases' source population. In the present study, the choice of neighborhood controls contemplates this requirement. Strong points are design of the study (case-control), early age of the adolescent mothers (14 to 16 years old), use of the National Live Births System records as source to select cases, inclusion of two community (neighbourhood) controls and sample size (1.288).

Conclusion

The present study indicates that sociodemographic factors (economic classification, mother who had her first child during adolescence and age at menarche), factors related to lifestyle (schooling failure before pregnancy, tobacco and alcohol consumption) and social and family relationships (reported having no one to trust) contributed, independently, to the determination of motherhood in adolescents aged 14 to 16 from Southern Brazil. These factors, especially schooling failure which presented the higher risk, highlight the important role of the school in this population's development. Schools committed to the adolescent's integral health, offering an inclusive, challenging and healthy living environment, are basic prerequisites to stimulate the intellectual and social capacity of this population, reducing the risk of early motherhood. Interdisciplinary research that investigates the perception of cultural, educational and family values in depth can identify important and complementary data which aid the understanding of the theme and the proposals for preventive interventions.

Collaborations

JU Béria, LB Schermann, AF Leal and JB Hilgert: conception and planning of the study; final revision of the manuscript and approval of the final version for publication; data analysis and interpretation; writing of the manuscript. AT Stein: conception and planning of the study; final revision of the manuscript and approval of the final version for publication; writing of the manuscript. GG Alves, S Câmara and L Palazzo: conception and planning of the study; final revision of the manuscript and approval of the final version for publication.

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