

Association between school context and occurrence of multiple sexual partners: cross-sectional study with multilevel analysis

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Abstract *The objective was to investigate the association between the school context and the occurrence of multiple partners among adolescents, considering individual variables (age, gender, Bolsa Família, LGB, early sexual initiation and use of alcohol or drugs in the last sex). Cross-sectional study with multilevel analysis carried out in 2018 with adolescent students from Olinda, Brazil. The variable (multiple partners) was collected based on the 'Youth Risk Behavior Survey' questionnaire. School context variables were time in school (regular school vs. full/semi-full school) and the Social Vulnerability Index of the school district. Of 2,500 participants, 1,044 were analyzed for being sexually active and most had two or more partners (63.89%). Regular school students were more likely (OR 1.47, CI 1.10-1.97) to have multiple sexual partners compared to those in full-day schools/half-day schools. However, no association was found in relation to the SVI of the schools' neighborhoods (OR 1.18, IC 0.82-1.70). More time spent at school was associated with fewer chances of multiple sexual partners, while studying in schools located in highly vulnerable neighborhoods was not associated with the occurrence of multiple sexual partners among adolescents.*

Key words *Adolescents, Sexual partners, Education, Social vulnerability index, Multilevel analysis*

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Introduction

It is during the adolescence, phase of life in which the search for autonomy and new experiences happens and when sexual activity begins, especially during high school¹. Such initiation will depend on cultural aspects, historical and social context, and each person individual life, and it may have negative and undesirable effects².

Frequently, adolescents cannot consistently use any form of contraceptive method³, therefore the occurrence of multiple sexual partners may lead to teenage pregnancy⁴ and to sexually transmitted infections (STIs)/Human Immunodeficiency Virus (HIV)⁵. It is worth pointing out that adolescents today are facing the highest incidence of new HIV infections worldwide⁶. If left untreated, these infections may have consequences as dire as infertility and death⁷.

The school environment is a place where adolescents spend a considerable portion of their lives⁸. In Brazil, public schools generally serve an economically disadvantaged group⁹ and, therefore, do not have access to extracurricular activities. There is strong evidence to suggest that schools that foster greater educational involvement among their students are more successful in reducing the use of illicit drugs¹⁰. And that full-day schools could well be the only opportunity this underprivileged group has in order to get access to extracurricular activities⁸.

Although the relationship between schools and health is already well known, there is still no theory that is able to clearly explain said relationship. Bonell *et al.*¹¹ have put forward an integrated theory based upon the findings of their systematic survey which points to four pathways. The first one takes into consideration the degree of the adolescent's involvement with their own school environment. Some schools provide their students with the opportunity of greater engagement, while others focus solely on academic pursuits. The second pathway evaluates the involvement among students belonging to the same school. In that sense, one potential approach would be to consider the proportion of committed students inside each school, given that there could be either a positive or negative contagious element. The third pathway considers the student's cognition and the schools' role in providing the positive stimulus for that cognition. Lastly, the fourth pathway takes into account the adolescents' adoption of certain types of behavior according to the schools structure regarding factors such as the sociability between students and staff and

the school's ability to supervise its space in order either to prevent instances of risky behavior or restrain them, should they occur¹¹. Building bridges between students and school staff could help encourage pro-school behavior and reduce instances of risky behavior that pose a threat to health. These bridges could be strengthened once these adolescents spent more time at school¹¹.

Schools with a greater participation stemming from students and a strong sense of community are able to reduce risky health-related behaviors¹². In turn, these behaviors – such as those deemed as antisocial, for instance – increase the likelihood of the adoption of anti-school behaviors^{10,12}. It has been observed that extracurricular activities and a broader social life in school make pro-school roles more attractive, having a positive impact in the form of the adoption of healthy behaviors. These behaviors tend to remain with students in the course of their adult lives^{10,12}.

The physical and social characteristics of the neighborhoods may also have a negative influence on the occurrence of health-related behaviors¹³. Neighborhoods that have a high social vulnerability may contribute towards risky behaviors since, as previous studies have demonstrated^{13,14}, the exposure to stressors linked with poverty increases one's vulnerability to health-related risky behaviors because of their use as coping strategies. In other words, risky behaviors would act as a way of relieving the tensions linked with the various aspects of poverty¹⁵.

At the individual level, it has already been established that the chances of having multiple sexual partners significantly increase with aging¹⁶, early sexual initiation⁴, gender^{16,17}, Lesbians, gays and bisexuals LGB¹⁸⁻²⁰ status and the consumption of alcohol^{16,21-22}.

In light of this, it is necessary to consider the importance of evaluating the context for the behaviors and outcomes that negatively impact the health of adolescents, since there could be a correlation between these results and the contextual characteristics in the same group²³. Because of this, adopting the multilevel model as an analytical strategy allows for the simultaneous examination of the effects of the contextual and individual level's variables in student behavior. Therefore, it is possible to examine the influence of variables stemming from different levels simultaneously²³.

Furthermore, unlike ecological studies, multilevel studies allow for the proper examination of just how the characteristics of the school affect the health of the adolescent in an institutional sense, as opposed to his/her individual charac-

teristics. This can be confirmed in the systematic revisions conducted by Ward-Peterson *et al.*²⁴ through the use of multilevel models, in which the studies have found that several contextual factors, including socio-economic and community-related factors and educational achievements, are associated with outcomes linked to risky sexual behaviors and HIV/AIDS. This was also the case in the study conducted by Bonnel *et al.*²⁵, where the results of the revised reports evinced the potential influence of the school environment over the student's health.

This work's main hypothesis was that spending more time at school would be a protection factor for student's health, since, generally speaking, full-day or half-day public schools are the ones that have better infrastructure and personal support. Moreover, the social vulnerability of the neighborhoods in which the schools were located was also taken into account. Thus, this article's aim is to investigate the association between the school environment (time spent at school and the Social Vulnerability Index of the neighborhood where the school is located) and the occurrence of multiple sexual partners among adolescents, considering the individual variables (age, gender, family allowance, LGB status, early sexual initiation and drug and alcohol use during the last sexual encounter).

Methods

Study design, population, and sample

This is a cross-sectional study conducted in school environments and which is part of a bigger project named "Oral health and modifiable health-related risky behaviors in adolescence – follow-up as a means of prevention."

The field research was carried out between February and June, 2018, in Olinda – a municipality in the state of Pernambuco, located in Brazil's northeast. According to the Brazilian Institute of Geography and Statistics (IBGE), in 2018 Olinda had an estimated population of 391,835 inhabitants – that is the 3rd largest population in Pernambuco²⁶. According to the 2010 Census, there were 62,025 adolescents aged between 10 and 19 in Olinda²⁷. The population of this study was made up of school going adolescents from Olinda's state schools aged between 14 and 19 years old (from both sexes). It is highlighted that according to the World Health Organization, it considered as an adolescent, the individual in the age group between 10 and 19 years of age²⁸.

The determination of the sample size was based on the following parameters: confidence level of 95%, power of 80% and an odds ratio of 1.4 that can be detected. The adoption of this odds ratio was based on the association between the excessive consumption of alcohol and cavities, which was one of the main goals of the larger study. Sample delineation was of the conglomerated type, involving the use of a correction of the effects of the design (c) of 1.2. In order to correct for eventual losses, the sample size has been increased by 20% [$100 / (100 - 2)$], making up a total sum of 2,206 students. 27 schools were taken into account and all of their high school classes.

Eligibility criteria

All adolescent high school students that were regularly enrolled in the 27 public state schools of Olinda-PE and that have accepted to be part of this study were deemed eligible. However, their participation was dependent upon the turning in of a formal Term of Consent signed by their parents/guardians or by the students themselves once they turned 18. The study did not take into account students with any sort of disability or dysfunction that made it impossible for them to personally and autonomously fill in the questionnaires. It is important to point out that this study was not devised for a multilevel analysis, and because of that, three out of the 22 neighborhoods that were analyzed had either two or three schools rather than only one for each neighborhood, which means that there was a total of 22 classified neighborhoods in relation to their Social Vulnerability Index SVI and 27 participating schools.

Study's variables

The data collection was carried out through the application of the Youth Risk Behavior Survey (YRBS)²⁹ questionnaire, both for the outcome variable and for the individual variables of the study.

The outcome variable (having multiple sexual partners) was collected by means of the question: "During your lifetime, with how many different people have you had a sexual relationship?" This variable has been categorized for the analysis as having two or more sexual partners over one's lifetime vs. having at least one sexual partner. Adolescents who have never had any sort of sexual activity were ruled out of the analysis.

The individual socio-economic variables analyzed were those of gender, age and family al-

lowance. The age group has been defined as being from 14 to 16 years old (1st third) vs. 17 to 19 years old (2nd third and 3rd third). The family allowance has been considered as a proxy for their revenue, since it is part of a government program created to aid poor and extremely poor families in Brazil. These families are given a monthly financial benefit and enter into a commitment pertaining to their own health and to keeping their children and adolescents in school³⁰⁻³¹.

The LGB variable (Lesbians, Gays and Bisexuals) was also analyzed at the individual level and was created through the crossing of two variables: the adolescent's sex (male vs. female) and their sexual partner's sex, collected using the question: "During your lifetime, were your sexual partners male or female?" The health vulnerability of this population group, named as a 'sexual minority', is linked to the LGBT discrimination that they suffer in their day-to-day lives since their sexuality differs from heteronormative standards, especially in adolescence³².

Risky sexual behaviors were evaluated through the following multiple choice questions: "How old were you when you had your first sexual relationship?", "Did you have any alcoholic drink or have you used any illicit drugs before your last sexual encounter?"

At the level of school context, these were the variables used: time spent at school (full-day/half-day school or regular school) and the Social Vulnerability Index (SVI) of each school's neighborhood. The time spent at school was collected from an external, public domain source³³. Regular schools have a minimum requirement of four daily school hours for at least 200 school days a year, while full-day/half-day schools have a minimum requirement of seven daily school hours, which means 1,400 hours annually³⁴. The higher number of school hours required for full-day or half-day schools could provide students with an environment of protection and that was helpful towards the improvement of individual attributes of resilience against social vulnerabilities³⁵, and thus against risky behaviors displayed in adolescence.

The Social Vulnerability Index (SVI) was categorized in the following order: high/very high and average/low/very low, and it was collected from a public domain source³⁶. It is an indicator that was developed to verify the negative impacts on health³⁷ from the standpoint of the selection of 16 indicators from the Atlas of Human Development Platform (ADH), and it is organized in three dimensions: 'urban infrastructure', 'human capital' and 'revenue and jobs'. The higher the SVI

of a given region, the higher its social vulnerability is, and consequently the living conditions of its population will be much poorer³⁸. The SVI was used to categorize the schools' social vulnerability based on the neighborhoods where they were located.

Statistical analysis

The data were set as a double entry in the software Epidata 3.1 and the errors that were found in the validation were corrected. For the data analysis, a database was built in Stata 15.1. In order to evaluate the personal, sexual and school context profile of the students, this study calculated the absolute and relative frequencies. The respective distributions of prevalence were built and the multilevel analysis was carried out with the use of the individual data as well as the school context data.

The multilevel analysis was initiated with the empty model (model 1). In model 2, we included the variables from the contextual level. The subsequent model (model 3) included only the variables from the individual level. The final model (model 4) included the variables from the contextual level along with the individual variables. For the analysis of the progression of the models' adjustments, we used the proportional change in variance (PCV) and 2 Res log-likelihood (Deviance). All conclusions were reached considering the confidence interval of 95%.

The medium odds ratio (MOR) was also used for analyzing the degree of heterogeneity among the contexts in each separate model. The MOR is the medium odds ratio between the individual with a higher propensity and the one with a lower propensity of displaying the referred outcome, diminishing the differences. For instance, it diminishes the differences between a given social context that has a higher chance of having a particular individual problem and a social context that has a lower chance³⁹.

This project was developed in accordance with Resolution n° 466/2012 of the National Health Council from the Ministry of Health and was approved by the Research Ethics Committee (n° 2.361.780).

Results

Out of the 2,500 students, 1,044 took part in the study on the basis of being sexually active. The reasons for this reduced number are either due

to adolescents who have not had any sexual relationships or to those who did not answer the questions that referred to any of the variables that were being analyzed, namely gender, age, family allowance, number of sexual partners, age of sexual initiation and drug or alcohol use during the last sexual encounter.

Most of these adolescents were in the age group from 17 to 19 years old (58.24%) and were not recipients of any sort of family allowance (55.75%). Half of all participants were male (50.19%). The prevalence of multiple sexual partners (two or more) was of 63.89% (Table 1).

When it comes to the time spent in school, adolescents in regular schools (who spend less time in school, with a minimum daily requirement of four hours) had more chances of having

multiple sexual partners compared to those in full-day schools (who spend more time in school, with a minimum daily requirement of seven hours) (Table 2).

For the variables at the individual level, associations were observed among older male adolescents with LGB sexual orientations, early sexual initiation and drug and alcohol use during their last sexual encounter. The family allowance (which was the proxy for their revenue) did not show any association with the occurrence of multiple sexual partners (Table 2).

According to the MOR, the differences between the schools that display a higher chance of having multiple sexual partners and schools that display a lower chance gradually decreased from model 1 to model 4, coming close to zero in the final model (Table 2). Regarding the PCV, we have observed its progressive reduction among the models, which demonstrated that the final model helps explaining almost all the variance found in the initial model (model 4: PCV= -99.99%).

Table 1. Socio-demographic characteristics, sexual orientation, risky sexual behaviors and school context.

Variables	N (%)
Age	(n = 1,044)
14-16 years old	436 (41.76)
17-19 years old	608 (58.24)
Gender	(n = 1,044)
Female	520 (49.81)
Male	524 (50.19)
Family allowance	(n = 1,044)
Yes	462 (44.25)
No	582 (55.75)
LGB	(n = 1,044)
No	926 (88.70)
Yes	118 (11.30)
Number of sexual partners	(n = 1,044)
1	377 (36.11)
2 or more	667 (63.89)
Sexual initiation < 15 years old	(n = 1,044)
No (≥ 15 years old)	571 (54.69)
Yes (≤ 14 years old)	473 (45.31)
Drug or alcohol use during the last sexual encounter	(n = 1,044)
No	803 (76.92)
Yes	241 (23.08)
Type of school (27 schools)	(n = 1,044)
Regular (18 schools)	584 (55.94)
Full-day/half-day (9 schools)	460 (44.06)
Social Vulnerability Index by neighborhood (22 neighborhoods)	(n = 1,044)
High/very high (≥ 0.4) (6 schools)	200 (19.16)
Average/low/very low (≤ 0.39) (21 schools)	844 (80.84)

Source: Authors.

Discussion

This study's initial hypothesis was confirmed considering the time spent at school, meaning adolescents who spent less time at school showed higher chances of having multiple sexual partners. On the other hand, the SVI of the neighborhoods where each school was located did not contribute to explaining the occurrence of multiple sexual partners in adolescence, whose explanation may be found in the fact that the SVI evaluated in this study referred to the schools' neighborhoods and not to those where the adolescents lived.

More time spent at school leads to more complementary activities being performed by adolescents, and this practice impacts their emotional well-being, reducing their anxiety and thus mitigating risky behaviors and keeping them from seeking multiple sexual partners⁸. More time spent at school could also be linked with other aspects that contribute to positive health-related outcomes, such as greater engagement levels in school activities, cognitive development and academic aspirations, to name a few examples^{10-12,40}. It is still worth pointing out that Brazilian public schools meet the needs of students who are mostly part of socio-economically disadvantaged social groups that do not have any alternatives for healthy development outside of school itself. In other words, our findings show that remaining in

Table 2. Association between individual variables, school context variables and multiple sexual partners.

Parameters	Empty model (Model 1)	Random intercept, fixed variable contextual effects (Model 2)	Random intercept, fixed variable individual effects (Model 3)	Random intercept, fixed effects (individual + contextual variables) (Model 4)
Fixed part				
Individual factors				
Constant	1.77*** [1.47,2.13]	1.35* [1.06,1.72]	0.32*** [0.23,0.45]	0.26*** [0.18,0.37]
17-19 years old vs. 14-16 years old			1.92*** [1.41,2.60]	1.81*** [1.34,2.46]
Male vs. female			2.41*** [1.80,3.23]	2.38*** [1.78,3.18]
Family Allowance (No vs. Yes)			1.05 [0.79,1.41]	1.08 [0.81,1.45]
LGB (Yes vs. no)			3.10*** [1.82,5.29]	3.17*** [1.87,5.38]
Early sexual Initiation < 15 years old (Yes vs. no)			4.10*** [2.99,5.61]	4.08*** [2.99,5.58]
Drug or alcohol use during the last sexual encounter (yes vs. no)			3.44*** [2.29,5.18]	3.39*** [2.26,5.08]
Contextual factors (school level)				
Regular school vs. full-day School/half-day school		1.53** [1.13,2.08]		1.47** [1.10,1.97]
Social Vulnerability Index by neighborhood (22 neighborhoods) (High/very high vs. Average/low/ very low)		1.14 [0.78,1.67]		1.18 [0.82,1.70]
Random part				
Variance area (Random intercept)	0.33[0.18,0.61]	0.20[0.06,0.65]	0.25[0.09,0.67]	2.09e-08
PCV*		-39.39%	-24.24%	-99.996%
Medium odds ratio	MOR = 1.37077	MOR = 1.21064	MOR = 1.27323	MOR = 1
2 Res log-likelihood observations	1358.95182 1044	1352.70758 1044	1127.65516 1044	1121.89198 1044

* p < 0,05; ** p < 0,01; *** p < 0,001.

Source: Authors.

that environment for longer not only contributes to one's education but also proves to be quite positive for their health.

Economically underprivileged neighborhoods are associated with risky sexual behaviors that may pose a threat to health⁴¹. This study has initially considered that the students' trip to school passing through neighborhoods with a high SVI could have a negative impact on these youngsters' health. However, this hypothesis was not proven to be true. One possible explanation for this finding could be the lack of information with respect to how students make their way to

school. It may be the case that some students are forced to expose themselves to more risks, going to school by foot and crossing more vulnerable neighborhoods, while others could be going to school in generally safer circumstances – using means of public transportation, for instance.

The social and individual contexts ought to be considered alongside one another in order to aid in changing health-related behaviors¹⁴. At the individual level, higher chances of having multiple sexual partners were observed among older²², male adolescents⁴²⁻⁴⁴ with LGB¹⁹⁻²¹ sexual orientations who had had an early sexual initiation¹

and had used either drugs or alcohol during their last sexual encounter⁴⁵. The lack of significance in the association between family allowance and multiple sexual partners was an unexpected result, since the literature has indicated that there are higher chances of multiple sexual partners among economically underprivileged populations²². Conversely, although this study has tried to differentiate a small socio-economic gradient inside this layer of the population using the 'family allowance' criteria, in general terms, the entire population that was studied is part of more disadvantaged social groups.

The findings suggest that investing in full-day schools would promote the healthy development of young people in our country. It is also worth noting that the financial impact of this issue could be minimized once we consider that the permanence of students in school for more hours would imply the reduction of a risk factor – the number of sexual partners – for cases of STI/HIV, which generate really high treatment costs for the government⁵.

As a limitation from this being a cross-sectional study, the independent variables and the conclusions were collected simultaneously and frequently it can be defined which one precedes the other. Other matter in question is the use of questionnaires that provides speed and low cost to data collection but even with guaranteed confidentiality, the participant may present some

level of concern when providing information regarding sexual intercourse, specially because sexual initiation is an important event in the life of a teenager⁴⁶.

Conclusion

This study refers to the data collected before the pandemic and the findings emphasize that more time spent at school would reduce the risk of students having multiple sexual partners. On the other hand, schools that were located in neighborhoods with a high social vulnerability did not present significant associations.

Considering that the increase in school time reduces the risks of multiple sexual partners and thus the risk for STI/HIV, the findings suggest that public investment in the expansion and implementation of full-day schools could be derived from the likely decrease in government spending in HIV/AIDS treatment that should be brought about by this change. There is also the point to be made that full-day schools would obviously greatly benefit the education of youngsters as well, who are the future of our nation. Furthermore, this study presents the need of performing educational actions related to sexual and reproductive health, in an intersectoral manner on behalf of promotion the safe sexual and reproductive behavior during the adolescence, subject still considered as taboo in Brazil.

Collaborations

JQP Silva: contributed to the literature review, elaboration of the methodology, collection and analysis of data and writing of the manuscript. NCA Lima: contributed to the bibliographic review, elaboration of the methodology, collection and analysis of data. IN Santos: bibliographic review, critical review of the content, writing of the manuscript and conclusions. VA Menezes: contributed significantly to the design of the research project, guidance on methodology and direction in the analysis of results. VCSA Amorim: contributed significantly to the design of the research project, guidance on methodology and direction in the analysis of results. FGB Bezerra: contributed significantly to the design of the research project, guidance on methodology and direction in the analysis of results. CFBF Santos: contributed significantly to the design of the research project, guidance on methodology, direction in the analysis of results and critical review of the content.

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