

# FACTOR ANALYSIS AND CRONBACH'S ALPHA FOR STUDYING THE KNOWLEDGE OF ADOLESCENTS ON HIV/AIDS: A CONSTRUCT VALIDATION STUDY

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## Abstract

To analyze the efficacy and psychometric properties of the Knowledge, Attitudes, and Practices Questionnaire when applied to adolescents. It was a cross-sectional construct validation study. Ten questions on the knowledge of HIV/AIDS were selected from the questionnaire for further data analysis and applied to 623 adolescents attending high school. The Statistical Package for the Social Sciences (SPSS) 25.0™ and Stata 14.0 software processed the data. Cronbach's Alpha verified the reliability of items, and the mean of each value ranged from 0.198 to 0.379. Factor analysis assessed the structure of correlations between variables. The resulting factors were lifestyle/habits, preventive actions, and endogenous and exogenous transmission. The scale was reliable for the studied population, ensuring the quality of the instrument.

**Keywords:** Acquired immunodeficiency syndrome. Adolescent. Sexually transmitted diseases. Validation study.

## 1. Introduction

Sexually transmitted infections (STIs) are syndromes and infections from pathogens that spread by the sexual contact of infected people without using condoms. They present high prevalence and incidence rates, which makes them a significant public health problem (Bottega et al. 2016).

According to the 2018 Epidemiological Bulletin of HIV/AIDS by the Brazilian Ministry of Health, HIV rates decreased in the Brazilian population, with 18.3/100,000 inhabitants in 2017 and 21.7/100,000 inhabitants in 2012 (Brazil 2018). The numbers remain expressive and require public policies for coping. In adolescence, these rates are higher in men, with a ratio of 22 men for every ten women (Brazil 2018).

The literature has indicated inefficacy regarding the knowledge of STIs by adolescents, and the highest level was reported for the human immunodeficiency virus (HIV)/AIDS (Doubova et al. 2017). There is evidence of several consequences of HIV in children and adolescents, such as impairments in physical fitness, cardiorespiratory fitness, body composition, social participation, and social distancing (Okamoto et al. 2016).

Knowledge of STIs, preventive methods, and health education projects are highly relevant to keeping the incidence of this infection from advancing in the general population, especially among young people (Almeida et al. 2017). Hence, authors have attempted to develop instruments to evaluate preventive actions for HIV/AIDS (Moser and Traebert 2011; Carvalho et al. 2017). Constructing and validating reliable tools is primary to measure indicators and the consequent health praxis improvement (Leite et al. 2018).

The Knowledge, Attitudes, and Practices Questionnaire (KAPQ) was used in 2017 (Cordeiro et al. 2017) to evaluate the knowledge and practices of school adolescents regarding STIs/AIDS in a countryside town in Rio Grande do Norte (RN), Brazil. The construct effectively evaluates the knowledge, attitudes, and practices related to STIs of school adolescents.

Considering the KAPQ has been used in a single study so far and the significance of analyzing the knowledge level of HIV/AIDS by adolescents, this article aimed to investigate the efficacy and psychometric properties of the instrument applied to adolescents.

## 2. Material and Methods

It was a cross-sectional study on the Knowledge, Attitudes, and Practices Questionnaire (KAPQ). The research occurred in public high schools in an urban area in the eastern region of Seridó, RN, Brazil.

The sample calculation was based on the outcome of a previous study (Cordeiro et al. 2017) conducted in Caico, RN, Brazil, which found an adequate knowledge prevalence of 31.4%. A 5% absolute margin of error, a 1.5 design effect (depending on the use of cluster sample), and a 20% non-response rate resulted in a sample of 623 individuals.

The sample included students from the selected schools older than 14 years and 19 years, 11 months, and 29 days or younger. The study excluded students who transferred to another educational institution and attended Youth and Adult Education (YAE) or technical education. It was a random sample constituted by proportional stratified sampling.

This study resulted from a previous one (Cordeiro et al. 2017) that applied the 50 questions in the KAPQ to the selected sample. The present study chose ten questions on the knowledge of HIV/AIDS for further data analysis. A sociodemographic questionnaire created by the researchers was also applied to characterize the sample (Cordeiro et al. 2017).

The two confidential and interactive electronic questionnaires were applied and entered into the school computers, to which the research subjects had access on scheduled dates and times. This measure was necessary to prevent biases in more personal questions, allowing the adolescents to answer the questionnaires privately.

The collection was performed by the main author and three volunteer researchers previously trained on the study objectives, methodology, and significance, and the data collection procedure, at the Multicampi School of Medical Sciences (EMCM) in Caicó, RN, Brazil. Data collection occurred from April to June 2019 in the computer rooms of the educational institutions selected for the research. The questionnaires were self-applied to reduce a potential response bias caused by the fear of participants answering personal questions.

The data were tabulated in Microsoft Office Excel™ after electronically obtained via Google Drive tools, a service for storing and synchronizing files, allowing the preparation of questionnaires in electronic media.

The Statistical Package for the Social Sciences (SPSS) 25.0™ and Stata 14.0 software processed the data. The reliability of the questions/items was verified with the internal consistency coefficient (Cronbach's Alpha), and validity was determined with the correlation of each item to the full scale when excluding the item. The answer options for each questionnaire item presented dichotomous variables with YES and NO values.

Factor analysis was also performed to define the underlying structure in a data matrix, addressing the problem of analyzing the correlation structure among many variables, and defining a set of common latent dimensions called factors, which considers all variables simultaneously and interrelated. It can also achieve objectives from an exploratory or confirmatory perspective. The analysis was divided into the

following phases: data entry, calculation of correlations, extraction of initial factors, and rotation (Moita Neto 2004).

The study followed the recommendations of the Declaration of Helsinki (2000) and Resolution 510 (2016) of the Brazilian Health Council because it involves human beings. All respondents signed a Free and Informed Consent Form. The Research Ethics Committee of the Federal University of Rio Grande do Norte (HUOL/UFRN) evaluated the study project - Protocol #99473118.2.0000.5292.

### 3. Results

The study included 623 high-school adolescents. Regarding sociodemographic characteristics, women were more prevalent (54.7%), and the average age was 16.4 ±1.13 years. Most respondents declared not having a partner (94.4%), being brown (48.8%), and attending the first year of high school (42.4%). The majority of adolescents lived with their parents (85.7%), in their own homes (75.1%), and did not have children (89.7%). They did not work or perform a paid activity during their studies (78.0%). As for religion, the majority self-refers on some type of religion, and 72.4% of participants affirmed attending religious ceremonies (Table 1).

Regarding family history, the mothers of adolescents showed a higher level of education than the fathers. Thirty-one percent of mothers attended high school, while fathers mostly attended elementary school (29.7%). As for family income, 62.0% of respondents lived on an income between R\$510.00 and R\$1,530.00 (in Brazilian Reais), and the primary family provider was the mother or father (87.2%).

Statistical analyses of the psychometric properties of the scale were performed with Cronbach's Alpha (Table 1) and Factor Analysis by Principal Components (Table 2).

**Table 1.** Cronbach's Alpha analysis based on ten standardized items related to the Knowledge, Attitudes, and Practices Questionnaire. Natal, RN, Brazil, 2020.

Variable	Item mean	Cronbach's Alpha value when excluding the item
Do you think people can get AIDS if they have sex without a condom?	6.60	0.378
Do you think people can get AIDS if they use the same cutlery, plates, and cups as someone who has AIDS?	6.98	0.198
Do you think people can get AIDS if they kiss the lips of someone who has the AIDS virus?	7.07	0.240
Do you think people can get AIDS if they use the same bathroom as someone who has AIDS?	6.93	0.295
During pregnancy or childbirth, can a mother pass on the AIDS virus to a child?	6.72	0.379
Can babies get AIDS when receiving breast milk from a woman who has the AIDS virus?	6.94	0.488
Can people get AIDS from insect bites such as mosquitoes?	6.89	0.378
Can people get AIDS if they receive blood contaminated with the AIDS virus?	6.60	0.360
Can people become infected with the AIDS virus if they use the same syringe and needle as someone else?	6.60	0.363
Can children get AIDS if they play with another child who has the virus?	6.69	0.306

Source: Survey data, 2020.

The Cronbach's Alpha analysis based on standardized items was 386 out of ten items analyzed. The mean of each item ranged from 0.198 to 0.379, described in Table 2. After excluding the item "Can babies get AIDS when receiving breast milk from a woman who has the AIDS virus?", Cronbach's Alpha value was 0.488, which is not significant. Therefore, assessing instrument reliability is highly suggested, benefiting the evaluation of the knowledge level of HIV/AIDS and the risk of ignorance among students.

The factor analysis value to obtain factors about knowledge of HIV/AIDS was 0.639 for KMO (Kaiser-Meyer-Olkin) statistics, considered adequate. Bartlett's scouting test was significant ( $\chi^2$ : 762,479; GL: 45; p-value<0.001), with a total of observations of 623 individuals and a total cumulative variance of 0.763.

The interpretation of results indicated that four factors represented a suitable structure for explaining the data, and Table 2 illustrates the factor load and scores after rotation.

The four described factors were created by correlations between the variables from the knowledge of HIV/AIDS. The first factor was lifestyle/habits and included the following variables: "Do you think people

can get AIDS if they use the same cutlery, plates, and cups as someone who has AIDS?"; "Do you think people can get AIDS if they kiss the lips of someone who has the AIDS virus?"; "Do you think people can get AIDS if they use the same bathroom as someone who has AIDS?"; "Can children get AIDS if they play with another child who has the virus?"

In the second factor addressing preventive actions, the variables were grouped as follows: "Do you think people can get AIDS if they have sex without a condom?"; "Can people get AIDS if they receive blood contaminated with the AIDS virus?"; "Can people become infected with the AIDS virus if they use the same syringe and needle as someone else?"

Regarding the third factor of endogenous transmission, the variables were "During pregnancy or childbirth, can the mother pass the AIDS virus to the child?"; "Can babies get AIDS when receiving breast milk from a woman who has the AIDS virus?"

Finally, the fourth factor of exogenous transmission included the variable "Can people get AIDS by an insect bite, such as mosquitoes?"

**Table 2.** Factor analysis by principal components for the variables related to the Knowledge, Attitudes, and Practices Questionnaire. Natal, RN, Brazil, 2020.

Variable	Factor 1 Lifestyle/Habits	Factor 2 Preventive actions	Factor 3 Endogenous transmission	Factor 4 Exogenous transmission
Do you think people can get AIDS if they have sex without a condom?	-0.164	0.638	-0.155	0.472
Do you think people can get AIDS if they use the same cutlery, plates, and cups as someone who has AIDS?	0.904	0.020	-0.082	0.084
Do you think people can get AIDS if they kiss the lips of someone who has the AIDS virus?	0.833	-0.061	-0.081	0.097
Do you think people can get AIDS if they use the same bathroom as someone who has AIDS?	0.668	-0.263	0.047	0.223
During pregnancy or childbirth, can the mother pass the AIDS virus to the child?	0.050	0.171	0.870	-0.142
Can babies get AIDS when receiving breast milk from a woman who has the AIDS virus?	-0.376	0.092	0.786	0.070
Can people get AIDS from insect bites such as mosquitoes?	0.158	-0.116	-0.052	0.878
Can people get AIDS if they receive blood contaminated with the AIDS virus?	0.065	0.895	0.204	-0.096
Can people become infected with the AIDS virus if they use the same syringe and needle as someone else?	0.034	0.916	0.108	-0.092
Can children get AIDS if they play with another child who has the virus?	0.796	0.273	-0.150	-0.082
Attributable variance	2,792	2,244	1,492	1,109

Source: Survey data, 2020.

The distribution of factors categorized among sociodemographic variables showed a higher average of correct answers to the questions on preventive actions among all variables. After applying the statistical procedures, sociodemographic, economic, knowledge, and belief variables affected the individual vulnerability of young people and were interrelated.

**Table 3.** Factor analysis by sociodemographic and economic variables. Natal, RN, Brazil, 2020.

Variable	Factor 1 Lifestyle/Habits		Factor 2 Preventive actions		Factor 3 Endogenous transmission		Factor 4 Exogenous transmission	
	Mean(±)	CI (95%)	Mean(±)	CI (95%)	Mean(±)	CI (95%)	Mean(±)	CI (95%)
Sex								
Male	5.98(0.16)	(5.67- 6.30)	8.41(0.08)	(8.27- 8.56)	6.33(0.14)	(6.05- 6.61)	6.43(0.13)	(6.18- 6.69)

Table 3. Continued.

Female	5.87(0.14)	(5.58-6.15)	8.52(0.07)	(8.38-8.65)	6.64(0.13)	(6.39-6.88)	6.36(0.12)	(6.12-6.59)
Marital status								
With a partner	6.17(0.43)	(5.34-7.01)	8.51(0.19)	(8.14-8.88)	6.45(0.40)	5.67-7.23)	6.47(0.37)	(5.75-7.19)
No partner	5.90(0.11)	(5.69-6.12)	8.47(0.05)	(8.37-8.57)	6.50(0.10)	(6.31-6.69)	6.39(0.09)	(6.21-6.56)
Level of education								
1 <sup>st</sup> year of high school	5.87(0.172)	(5.53-6.21)	8.43(0.082)	(8.27-8.59)	6.35(0.16)	(6.04-6.66)	6.41(0.14)	(6.14-6.68)
2 <sup>nd</sup> year of high school	5.96(0.18)	(5.60-6.31)	8.52(0.085)	(8.36-8.69)	6.50(0.17)	(6.17-6.82)	6.43(0.15)	(6.13-6.72)
3 <sup>rd</sup> year of high school	5.95(0.21)	(5.55-6.36)	8.47(0.099)	(8.28-8.67)	6.73(0.17)	(6.40-7.06)	6.32(0.17)	(5.97-6.66)
Race								
Black	5.33(0.46)	(4.42-6.24)	8.52(0.21)	(8.12-8.93)	6.46(0.33)	(5.81-7.11)	6.66(0.36)	(5.97-7.34)
White	6.03(0.16)	(5.73-6.34)	8.43(0.08)	(8.27-8.58)	6.64(0.14)	(6.36-6.91)	6.26(0.14)	(5.99-6.54)
Indigenous	5.28(0.79)	(3.73-6.83)	8.59(0.31)	(7.98-9.20)	5.01(0.76)	(3.52-6.50)	6.40(0.54)	(5.34-7.45)
Brown	5.92(0.16)	(5.61-6.23)	8.50(0.07)	(8.36-8.64)	6.46(0.14)	(6.19-6.73)	6.47(0.12)	(6.23-6.71)
Religion								
Yes	5.93(0.12)	(5.70-6.16)	8.46(0.06)	(8.35-8.57)	6.48(0.10)	(6.28-6.69)	6.43(0.09)	(6.25-6.62)
No	5.85(0.28)	(5.31-6.40)	8.54(0.16)	(8.29-8.79)	6.58(0.25)	(6.09-7.07)	6.10(0.26)	(5.59-6.62)
Attends religious ceremonies								
Yes	5.89(0.13)	(5.64-6.13)	8.43(0.06)	(8.30-8.55)	6.53(0.11)	(6.30-6.75)	6.44(0.10)	(6.24-6.64)
No	6.00(0.21)	(5.60-6.41)	8.59(0.07)	(8.45-8.73)	6.42(0.18)	(6.07-6.77)	6.27(0.17)	(5.94-6.60)
Household								
With a partner	5.80(0.52)	(4.79-6.81)	8.75(0.18)	(8.40-9.11)	5.56(0.51)	(4.55-6.57)	6.54(0.45)	(5.66-7.43)
Alone	8.99(0.23)	(8.55-9.41)	8.70(0.14)	(8.42-8.97)	6.90(1.64)	(3.68-10.13)	3.80(0.47)	(2.88-4.72)
With children	5.97(0.34)	(5.30-6.65)	8.54(0.13)	(8.28-8.79)	6.31(0.30)	(5.72-6.91)	6.19(0.27)	(5.66-6.72)
With parents	5.91(0.12)	(5.68-6.13)	8.45(0.06)	(8.34-8.56)	6.56(0.10)	(6.36-6.76)	6.42(0.10)	(6.23-6.60)
Parents' marital status								
Married	5.87(0.14)	(5.59-6.15)	8.45(0.07)	(8.31-8.58)	6.50(0.12)	(6.26-6.75)	6.40(0.12)	(6.17-6.62)
Not married	5.98(0.16)	(5.66-6.30)	8.50(0.07)	(8.36-8.65)	6.49(0.15)	(6.20-6.78)	6.38(0.13)	(6.12-6.65)
Number of children								
4 or more	6.84(1.45)	(3.99-9.70)	7.96(0.97)	(6.04-9.87)	5.99(0.87)	(4.28-7.70)	3.66(0.39)	(2.90-4.42)
1-3	5.65(0.33)	(5.00-6.31)	8.53(0.18)	(8.18-8.88)	5.83(0.32)	(5.20-6.45)	6.02(0.31)	(5.42-6.63)
None	5.94(0.11)	(5.72-6.17)	8.47(0.05)	(8.36-8.57)	6.57(0.10)	(6.38-6.77)	6.45(0.091)	(6.27-6.63)
Maternal education								
None	5.17(0.74)	(3.71-6.62)	8.42(0.53)	(7.37-9.47)	5.82(0.83)	(4.18-7.45)	6.32(0.67)	(5.00-7.64)
1 <sup>st</sup> to 4 <sup>th</sup> year of elementary school	5.81(0.25)	(5.32-6.29)	8.61(0.11)	(8.40-8.83)	6.34(0.22)	(5.90-6.78)	6.20(0.21)	(5.79-6.62)

Table 3. Continued.

Complete elementary school	6.04(0.18)	(5.69-6.39)	8.47(0.09)	(8.30-8.64)	6.67(0.16)	(6.36-6.98)	6.54(0.15)	(6.25-6.83)
High school	6.03(0.20)	(5.64-6.42)	8.42(0.08)	(8.26-8.59)	6.51(0.17)	(6.18-6.85)	6.39(0.15)	(6.09-6.69)
Higher education	6.04(0.58)	(4.91-7.17)	8.42(0.23)	(7.96-8.87)	7.05(0.33)	(6.40-7.70)	6.64(0.45)	(5.75-7.53)
Unknown	5.46(0.32)	(4.83-6.09)	8.41(0.19)	(8.04-8.78)	6.02(0.34)	(5.35-6.69)	6.11(0.28)	(5.55-6.67)
Paternal education								
None	5.58(0.41)	(4.77-6.39)	8.16(0.29)	(7.60-8.72)	6.59(0.37)	(5.86-7.33)	6.14(0.41)	(5.32-6.95)
1 <sup>st</sup> to 4 <sup>th</sup> year of elementary school	5.92(0.22)	(5.49-6.35)	8.52(0.09)	(8.34-8.71)	6.73(0.19)	(6.35-7.11)	6.33(0.19)	(5.96-6.69)
Complete elementary school	6.09(0.19)	(5.73-6.46)	8.56(0.09)	(8.39-8.73)	6.43(0.17)	(6.09-6.77)	6.41(0.15)	(6.10-6.71)
High school	5.94(0.28)	(5.40-6.48)	8.43(0.12)	(8.20-8.66)	6.40(0.23)	(5.95-6.86)	6.50(0.21)	(6.10-6.91)
Higher education	7.01(0.58)	(5.86-8.16)	7.62(0.38)	(6.88-8.36)	6.67(0.57)	(5.55-7.79)	6.59(0.43)	(5.73-7.44)
Unknown	5.60(0.25)	(5.11-6.08)	8.55(0.11)	(8.34-8.76)	6.35(0.22)	(5.91-6.79)	6.41(0.19)	(6.03-6.79)
Home ownership								
No	5.76(0.21)	(5.35-6.28)	8.58(0.08)	(8.41-8.74)	6.24(0.20)	(5.85-6.63)	6.49(0.17)	(6.15-6.84)
Yes	5.97(0.12)	(5.73-6.22)	8.44(0.06)	(8.32-8.56)	6.58(0.11)	(6.37-6.80)	6.36(0.10)	(6.16-6.56)
Employment during studies								
No	5.93(0.12)	(5.69-6.17)	8.45(0.06)	(8.33-8.57)	6.53(0.11)	(6.32-6.75)	6.43(0.10)	(6.24-6.63)
Yes, up to 3 years	5.26(0.60)	(4.08-6.44)	8.34(0.25)	(7.86-8.83)	6.79(0.42)	(5.96-7.62)	6.27(0.54)	(5.20-7.34)
Yes, more than 3 years	6.41(1.35)	(3.76-9.06)	8.55(0.20)	(8.15-8.95)	5.29(1.10)	(3.12-7.46)	6.17(0.88)	(4.44-7.90)
Yes, less than 1 year	5.59(0.33)	(4.93-6.24)	8.60(0.14)	(8.35-8.87)	6.35(0.28)	(5.77-6.88)	6.30(0.27)	(5.76-6.84)
Yes, the whole time	6.44(0.33)	(5.79-7.09)	8.59(0.11)	(8.37-8.81)	6.35(0.35)	(5.65-7.04)	6.16(0.34)	(5.49-6.84)
Primary family provider								
Partner	5.42(0.70)	(4.05-6.79)	8.76(0.16)	(8.45-9.07)	5.72(0.67)	(4.41-7.03)	6.91(0.57)	(5.79-8.03)
Parents	5.92(0.12)	(5.69-6.14)	8.43(0.06)	(8.32-8.54)	6.56(0.10)	(6.36-6.76)	6.43(0.09)	(6.25-6.62)
Siblings	6.45(1.92)	(2.68-10.23)	8.74(0.15)	(8.45-9.04)	7.46(0.61)	(6.27-8.65)	5.87(1.00)	(3.90-7.84)
Other	5.86(0.34)	(5.20-6.52)	8.74(0.14)	(8.47-9.01)	6.15(0.37)	(5.42-6.88)	5.99(0.30)	(5.39-6.59)
Unknown	6.80(0.72)	(5.38-8.22)	8.77(0.22)	(8.33-9.20)	5.45(0.82)	(3.84-7.07)	5.69(0.89)	(3.95-7.44)
Current mean family monthly income								
None	5.54(0.83)	(3.91-7.18)	8.51(0.32)	(7.89-9.12)	6.59(0.78)	(5.07-8.11)	6.24(0.70)	(4.87-7.62)
Social benefits	6.31(0.42)	(5.49-7.13)	8.47(0.17)	(8.15-8.80)	6.64(0.33)	(5.99-7.29)	6.13(0.30)	(5.53-6.72)
Up to \$ 100	5.66(0.30)	(5.08-6.24)	8.54(0.16)	(8.23-8.85)	6.58(0.28)	(6.03-7.13)	6.19(0.26)	(5.68-6.69)
\$ 100 - 300	5.92(0.13)	(5.66-6.18)	8.50(0.06)	(8.38-8.62)	6.48(0.12)	(6.24-6.72)	6.49(0.11)	(6.27-6.71)

**Table 3.** Continued.

More than \$ 300	5.99(0.28)	(5.43-6.54)	8.32(0.14)	(8.04-8.60)	6.41(0.24)	(5.93-6.90)	6.31(0.23)	(5.87-6.76)
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Source: Survey data, 2020.

#### 4. Discussion

The knowledge of HIV/AIDS by young people has been indicated as a crucial factor in reducing the current incidence of this problem (Okamoto et al. 2016).

An effective instrument for evaluating this knowledge must be validated to allow theoretical/methodological support for further studies in this field (Leite et al. 2018). In this sense, aspects such as inadequate validation, the absence of rigorous methodological criteria, and the lack of instruments validated by trained professionals contribute to the frequent ineffectiveness of this process, hindering the improvement and dissemination of knowledge on the studied topic (Cano and Hobart 2011).

The factors on the knowledge of HIV/AIDS from the questionnaire by the Brazilian Ministry of Health, available on the VHL website through an access link (<https://bvsmms.saude.gov.br/bvs/publicacoes/141questionario.pdf>), were favorable for application to the target audience. This study found high reliability of the Knowledge, Attitudes, and Practices Questionnaire (KAPQ) applied to a population of adolescents attending high school in public schools in Rio Grande do Norte, Brazil.

Previous application of the instrument by another study included a pre-test phase (Cordeiro et al. 2017), causing a more dubious understanding of the methodological choice and the factors considered in the present study.

The selected statistical analyses were Cronbach's Alpha, considered the most usual reliability measure (Cunha et al. 2016), and factor analysis. These strategies are extensively used in studies aiming to analyze the validity of constructs (Tenorio et al. 2019).

The data suggested a satisfactory internal consistency and homogeneity of the analyzed items. The analysis also presented the contribution of each item to the construction of scales. Regarding the assessment of factors selected from their subscales, the values ranged from 0.638 to 0.916, suggesting internal reliability from moderate to almost perfect (Vieira 2011).

Factor analysis showed the construction of four factors, demonstrating how items tend to cluster. The first factor (lifestyles/habits) included the most variables, with four of the ten analyzed variables. Although the last factor (exogenous transmission) had only one variable, it presented high consistency, with an Alpha value of 0.878.

Thus, the KAPQ applied to adolescents presented validity and internal reliability to assess the knowledge of HIV/AIDS. This study may help other investigations in this field, contributing to scientific evolution and society.

As for limitations, the study included only adolescents from public schools presenting similar levels of education, making the sample homogeneous in this aspect. Hence, further studies must include more heterogeneous samples. Another limitation is that the questionnaire was self-applied, which may cause measurement bias because the answers depend on cognitive level and perception of respondents. However, this strategy was used to prevent adolescents from being embarrassed because of personal questions.

It is worth noting that the Brazilian public health system is a unique public health policy marked by its performance in a country known for continental dimensions and diversity. Also, primary care was and still is an innovative proposal for reorganizing the system, aiming to provide healthcare access to families and the community. Therefore, studies such as the present one seeking to validate research instruments to evaluate the performance of public health policies, health promotion, and service efficiency are paramount.

## 5. Conclusions

The present study achieved the proposed objective of analyzing the efficacy and psychometric properties of the Knowledge, Attitudes, and Practices Questionnaire (KAPQ) applied to adolescents. The results indicated the reliability of the scale in the studied population, ensuring the quality of the instrument. The scale presented similar results to those established in the theoretical framework.

Thus, demonstrating the validity of the KAPQ for the studied population expands the possibilities of effectively evaluating the system and planning actions to promote the quality of life of this population. Nevertheless, further studies are encouraged to analyze this scale in different populations, reaching other segments of society, and contributing to scientific advancement in fields attempting to evaluate the knowledge of HIV/AIDS.

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