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## ORIGINAL ARTICLE

# Reliability and validity of the Brazilian version of the Pittsburgh Sleep Quality Index in adolescents ☆

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Abstract

*Objective:* To evaluate the reliability and validity of the Brazilian version of the Pittsburgh Sleep Quality Index.

*Methods:* 309 adolescents, subdivided into a sample of 209 subjects, of whom 25 were reassessed, and another sample of 100 adolescents. Reliability was assessed using Cronbach's $\alpha$-values, intraclass correlation coefficient, Standard Error of Measure, Minimum Detectable Change, and Bland–Altman plotting. Exploratory analysis of the questionnaire components was performed based on the sample of 209 adolescents. Confirmatory factor analysis was performed with a sample of 100 individuals.

*Results:* The sample of 209 participants had a mean age of 14.38 ($\pm$1.94) years, comprising 80 (38.3%) girls and 129 (61.7%) boys. The sample of 100 adolescents had a mean age of 13.66 ($\pm$2.35) years, comprising 51 (51%) girls and 49 (49%) boys. The questionnaire obtained a Standard Error of Measure = 1.12 and Minimum Detectable Change = 3.10. Cronbach's $\alpha$ was 0.71 and the Intraclass Correlation Coefficient was 0.65 (95% CI: 0.21–0.85). The factor analysis showed that the best model of components was the one that consisted of two factors, excluding the component on the use of sleep medications.

*Conclusion:* The questionnaire showed high internal consistency and moderate reliability. Furthermore, a model with two factors seems to be the most appropriate to evaluate the quality of sleep in adolescents.

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### Confiabilidade e validade da versão brasileira do Índice de Qualidade do Sono De Pittsburgh em adolescentes

#### Resumo

*Objetivo:* Avaliar a confiabilidade e validade da versão brasileira do Índice de Qualidade do Sono de Pittsburgh.

*Métodos:* 309 adolescentes, subdivididos em uma amostra de 209 indivíduos, dos quais 25 foram reavaliados, e outra amostra de 100 adolescentes. A confiabilidade foi avaliada por meio dos valores de $\alpha$ de Cronbach, Coeficiente de Correlação Intraclasse, Erro Padrão da Medida, Mínima Mudança Detectável e plotado gráfico Bland-Altman. A análise exploratória dos componentes do questionário foi realizada com base na amostra de 209 adolescentes. A análise fatorial confirmatória foi realizada com a amostra de 100 indivíduos.

*Resultados:* A amostra de 209 participantes teve uma média de idade de 14,38 ($\pm$ 1,94) anos, sendo 80 (38,3%) meninas e 129 (61,7%) meninos. A amostra composta por 100 adolescentes, teve uma média de idade de 13,66 ($\pm$ 2,35) anos, sendo 51 (51%) meninas e 49 (49%) meninos. O questionário obteve Erro padrão da Medida = 1,12 e Mudança mínima detectável = 3,10. O $\alpha$ de Cronbach foi de 0,71 e Coeficiente de Correlação Intraclasse de 0,65 (IC95% 0,21 - 0,85). As análises fatoriais apontaram como melhor modelo de componentes aquele composto por dois fatores, com exclusão do componente sobre uso de medicamentos para dormir.

*Conclusão:* O questionário obteve elevada consistência interna e confiabilidade moderada. Além disso, um modelo de dois fatores parece ser o mais adequado para avaliar a qualidade do sono em adolescentes.

## Introduction

Sleep is a fundamental biological process, especially in the adolescent population, as growth hormone, which is essential for the individual's physical development, is secreted during sleep.[1] Inadequate sleep can cause damage to psychosocial health and academic performance, and can result in risk behavior development.[2]

Many tools can be used to assess the presence of sleep disorders, including questionnaires that can be used in clinical practice and epidemiological studies.[3] In Brazil, some tools that evaluate sleep habits have been validated, such as the Children's Sleep Habits Questionnaire (CSHQ), which aims to assess sleep problems in individuals, but is restricted to children.[4] The Morning/Evening Scale was validated for adolescents, which is limited to assessing wake-up and bedtime hours in adolescents, calling them morning and evening.[5]

The Pittsburgh Sleep Quality Index (PSQI) is a self-administered tool used to evaluate sleep quality and possible disorders in the previous month. It was developed by Buysse et al. in 1989 and validated in Brazil, in the adult population, by Bertolazi et al. in 2011. The questionnaire has been widely used in different populations, having been translated into and validated for different languages.[6–10]

In 2006, when assessing the structure of the PSQI in healthy adults and those with depression, Cole et al. questioned the capacity of the single PSQI score to measure the multidimensional nature of sleep disorders.[11] After factorial analyses of the components, the authors suggested that a three-factor score model would more appropriate to assess sleep characteristics. Other studies also provided evidence that a model with one more factor would be more appropriate to evaluate sleep characteristics in specific populations.[12–15] However, the study population characteristics can modify the structure of the questionnaire factors.

The Brazilian version of this tool was validated in an adult population; however, there is a lack of studies assessing the reliability of this tool in adolescent populations. Given this fact and the need to assess the factorial structure of the questionnaire in different populations, this study had a dual purpose: assessing the reliability of this sleep quality assessment tool and performing the factorial analysis of the PSQI components in adolescents.

## Methods

### Participants

The study population consisted of male and female adolescents, aged between 10 and 19 years, who engaged in amateur sports practice, from the city of Petrolina, state of Pernambuco, Brazil, in 2014. After performing a survey in schools and sports centers, a population of 521 young amateur athletes was identified. As the study performed three different analyses, it was necessary to perform different sampling procedures, as described below.

In the first stage, to perform the exploratory factor analysis, the following criteria were considered: estimated population of 521 amateur athletes; confidence interval of 95%; sampling error of five percentage points; estimated prevalence of sleep disorders of 30%,[16] which yielded the