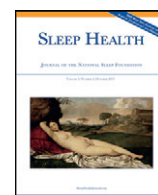




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## Associations between sleep quality and domains of quality of life in a non-clinical sample: results from higher education students

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## ABSTRACT

**Objective:** The association between sleep quality and quality of life (QoL) in clinical samples diagnosed with sleep disorders, mental disorders, or other medical conditions has been widely investigated. However, few studies focused on this relationship in samples of mostly young and healthy adults. This study analyzed the associations between sleep quality and several dimensions of QoL in higher education students and examined whether or not sleep quality would significantly predict QoL after statistically controlling for psychopathological symptoms.

**Design:** Observational and transversal.

**Setting:** Non-clinical; higher education.

**Participants:** A sample of 324 college students, aged 17 to 47 years ( $M = 20.89 \pm 2.85$ ) were enrolled.

**Measurements:** European Portuguese versions of the Pittsburgh Sleep Quality Index (PSQI), the WHOQOL-Bref to measure QoL, and the Brief Symptom Inventory (BSI) to measure psychopathological symptoms.

**Results:** All PSQI components were significantly associated with general QoL and the psychological and physical QoL domains. The subjective sleep quality and daytime dysfunction PSQI components were consistently associated with all WHOQOL-Bref domains and general QoL. Hierarchical regression analyses further showed that the PSQI components as a whole, and in particular subjective sleep quality, added significant contributions to the general QoL facet and to the psychological, physical, and environmental QoL domains, after controlling for psychopathological symptoms.

**Conclusions:** Several components of sleep quality and different facets/domains of QoL are associated in higher education students, particularly subjective sleep quality, which remains a significant predictor of most aspects of QoL, regardless of the presence of psychopathological symptoms.

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## Introduction

Quality of life (QoL) refers to the “individuals’ perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” (p. 1403).<sup>1</sup> Several studies have systematically demonstrated adverse effects when sleep behavior is compromised.<sup>2</sup> For example, sleep deprivation may cause: emotional problems;

impaired social, work, and academic performance; sleepiness; and impairment of cognitive functions, etc.<sup>3,4</sup>

According to the literature, the association between sleep quality and QoL in clinical samples diagnosed with sleep disorders (eg, insomnia) or other medical conditions (eg, cancer) has been extensively investigated. Notwithstanding, studies focused on the relationship between *sleep quality* and *QoL* in community samples of mostly healthy young adults are lacking despite the vast amount of published research about the general topic of sleep and QoL. For instance, when searching on Scopus database for published research concerning the association between quality of sleep and QoL (requiring in title the key-words: quality of sleep AND QoL), thousands of references are retrieved; but after removing clinical conditions, and

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after that particular situations or professional groups (eg, pregnancy; menopause women; elderly; shift workers; caregivers), the initial figures fall to dozens of studies. When further examining the abstracts to consider community/non-clinical samples comprising young adults with an emphasis on sleep quality (not just sleep duration or other sleep parameter) and QoL (not just well-being or satisfaction with life), we found only seven relevant results.<sup>5–11</sup> However, none of these seven studies were *controlled for general psychological symptoms*.

For example, Zeitlhofer et al.<sup>10</sup> studied an Austrian cohort ( $N = 1049$ ) aged over 15 years and found a moderate correlation between quality of sleep and QoL. Chen et al.<sup>8</sup> studied a sample of 2391 US young adults and found that the overall and mental health-related QoL were associated with various sleep disturbances. Andruskiene et al.<sup>5</sup> observed that self-reported sleep disturbances contributed to a worse health-related QoL as measured by the SF-36 in a large study ( $N = 1602$ ). Baldwin et al.<sup>6</sup> found that some sleep disturbances and health-related QoL are associated, but only studied people aged 40 years and older. Bower et al.<sup>7</sup> compared individuals with and without mood disorders and examined associations among sleep quality and positive and negative affect. Overall, sleep quality predicted positive affect. Other study has focused on a sample of Israeli adolescents and reported several associations between sleep variables and QoL. However, this research focused on morningness and did not control for general psychological symptoms.<sup>9</sup> In a study comprising a large community sample ( $N = 3225$ ) aged 18 to 55, Zhou et al.<sup>11</sup> found negative associations between sleep quality (measured by the PSQI) and QoL (SF-36) as expected—even when controlling for socio-demographic variables.

From all of these studies, we conclude that (i) the most common sleep quality metric was the PSQI; (ii) the QoL measure was variable and none of the studies used the WHOQOL-100 or WHOQOL-Bref; and (iii) the psychological symptoms were not consistently controlled.

Indeed, there are very few studies focused on healthy or non-clinical samples, and thus there is little knowledge on how the quality of sleep variations in these samples impact QoL. The few existing studies suggest a relationship between sleep quality and wellness, life satisfaction, or QoL even in samples comprising mostly healthy young adults (eg, college students<sup>10,12,13</sup>). These findings enhance the idea that the sleep may have significant impact on QoL even in the absence of sleep disorders or other health problems. This scenario is in accordance with the “sleep health” concept suggested by Buysse.<sup>14</sup>

Despite being mainly composed by healthy and young adults, many studies have shown that sleeping problems are quite common among college students.<sup>15,16</sup> For example, Wolfson<sup>17</sup> reported that 75% of college students have occasional sleep problems such as sleep-onset difficulties and excessive diurnal sleepiness. Also, delayed sleep phase syndrome is a frequent sleep problem in this population.<sup>18</sup> In a large study of university students, it was found that insomnia and insufficient sleep duration were the most common sleep problems.<sup>19,20</sup> A pattern characterized by poor sleep quality and a significant sleep restriction is common in college students, and various studies have suggested that poor quality of sleep is associated with a reduction in physical and psychological wellness.<sup>12,13</sup> Valdez, Ramirez and Garcia<sup>21</sup> posited that college students have an irregular sleep pattern characterized by the so-called “restriction-extension” sleep pattern. This is a reality consistent with the developmental tasks students face when transitioning to the university.<sup>22,23</sup> Some of these challenges pertain to alterations in students' social lives such as increased going out at night, leaving parents' home, reduction in parental control,<sup>23</sup> etc. These modifications may have a prominent role in inducing sleep disruption or sleep problems.

It is also known that psychological symptoms have an important role on self-reported QoL, and studies suggest that psychopathology might increase among college students for the past several years.<sup>24,25</sup> In a review by Hunt and Eisenberg,<sup>26</sup> it was observed that 17% of students reported depressive symptomatology, and 10% of them reported anxiety and stress-related symptomatology. In another study of 763 college students, more than a third had some kind of psychological problem.<sup>27</sup> Several factors can contribute to this scenario such as academic pressure, interpersonal problems, pre-occupations about the future, and financial difficulties.<sup>28</sup> As expected, psychological disturbances can affect sleeping behavior; still, this association is bi-directional.<sup>29,30</sup>

In sum, given the importance of sleeping behavior in several domains of students' life, it is, thus, germane to examine whether sleep quality-related variables constitute independent predictors of QoL apart from psychological symptomatology. In summary, the purpose of our study was twofold: (i) to analyze the associations between subjective sleep quality and several dimensions of QoL in higher education students, and (ii) to examine whether or not sleep quality is a significant predictor of QoL after statistically controlling for psychopathological symptoms. This study refers to the frequently assumed conceptualization of sleep quality as a broad concept generally encompassing quantitative aspects such as sleep duration and latency, number of nocturnal awakenings, and more subjective topics including self-assessed sleep depth and quality.<sup>31,32</sup>

## Method

### Participants

We recruited 361 participants from the University of Aveiro (UA) both in the classroom context and across campus. Only cases with complete datasets were used, and only 324 cases were analyzed. Participants had a mean age of 20.89 years ( $SD = 2.85$ ). The majority were female (65.7%) attending the 1st cycle of the university (66.7%) as full-time students (92.6%) after having left their parents' home to study at the university (65.1%) and now living in rented rooms in flats (59.6%). Most students reported that the places where they sleep have good conditions (good = 44.1% and very good = 41.0%). Furthermore, the majority did not identify sleep problems (88.6%) or mental health disturbances (95.7%).

### Measures

#### Sociodemographic and clinical data

Sociodemographic and clinical data were collected through a section based on a previous questionnaire section used in earlier research in undergraduates.<sup>20</sup> This section encompassed questions on age, sex, number of enrollments in university, field of study, student status (i.e., ordinary, worker-student), whether the entry in university implied left parents' home, type of housing, the quality of the habitual sleep place, and whether the students self-identified a sleeping problem and/or a mental health problem. These data were only used to characterize the sample and were not used to perform inferential analyses.

#### Sleep quality

The Pittsburgh Sleep Quality Index (PSQI) was used to assess self-reported sleep quality over the last month<sup>31</sup>. The PSQI contains 19 items (0–3 Likert scale). Furthermore, the items clustered together form seven components (i.e., subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction). There were five additional questions such as whether the subject has a roommate, but these were not considered for quantitative scoring. The sum of the

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