Original Article

# Evaluation of the psychometric properties of the Copenhagen burnout inventory–student survey (CBI-SS) among health profession educational students at a university in south India

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## Abstract

**Background & Objective:** Burnout is characterized by emotional exhaustion and affects diverse professionals, with healthcare students at high risk due to academic and clinical stressors. The Copenhagen Burnout Inventory–Student Survey (CBI-SS) has not been studied in healthcare students in the Indian context. This study aims to evaluate the psychometric properties of the English version of the CBI-SS.

**Material & Methods:** This cross-sectional study, conducted in 2022, included 416 undergraduate and 107 postgraduate students from health profession institutions at a private university. The response rate was 65.45%. Descriptive and inferential statistics were evaluated for the CBI-SS with 25 items via JMP software. The tool was subjected to content and face validity. The interitem correlation was tested before the scale was subjected to Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The EFA indices considered were Kaiser–Meyer–Olkin test (KMO) and the Bartlett test of specificity. The CFA fit indices included the degree of freedom, Tucker Lewis index (TLI), freedom ratio ($\chi^2$/df), Goodness-of-Fit Index (GFI), Comparative Fit Index (CFI), Root Mean Square Error Of Approximation (RMSEA), and Normed Fit Index (NFI).

**Results:** The content validity index averaged 0.9, and face validity was favorable. The Cronbach's alpha scores were between 0.7 and 0.8. The EFA yielded KMO values above 0.9, and Bartlett's test yielded chi-square = 8880.727, df = 300, $p < 0.0001$. The fit indices for CFA were the Tucker and Lewis indices, with a score of 0.919 and an RMSEA score of 0.068, demonstrating a relationship between the items and the constructs.

**Conclusion:** This study highlights the usefulness of the CBI-SS in assessing burnout in allied health science and dental student populations. The results indicate that the CBI-SS is a reliable and valid instrument for identifying student burnout and developing strategies to prevent burnout among potentially vulnerable student populations in the Indian context.

**Keywords:** CBI-SS, burnout syndrome, reliability, validity, healthcare professional students, Indian context

## Introduction

Burnout syndrome is an emotional exhaustion condition characterized by low mood, anxiety, impatience, and a lack of professional efficacy, which includes poor motivation, procrastination, detachment from work, and sentiments of cynicism resulting from long-term unresolved work-related stress (1). Burnout is a widespread problem that impacts individuals across diverse professional fields, and its occurrence is particularly notable among healthcare professional students engaged in educational and training programs (2).

The exhaustion dimension of burnout is significantly greater in clinical faculty members than in primary sciences faculty, primarily because of workload, dysfunctional work structures, and organizational mismanagement. The intense nature of clinical work,

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which often involves long hours, high-stake decision-making, and emotional labor, contributes significantly to their exhaustion. These working settings are very similar to the clinical work experience of students in allied health and dental fields (3).

Healthcare education presents unique challenges, including rigorous academic studies and demanding clinical experiences, which expose students to persistent stressors that can contribute to burnout. It is crucial to recognize and address burnout among this specific group of healthcare professional students, as their well-being not only affects their personal lives but also has significant implications for the future of healthcare delivery and patient outcomes (3, 4).

Burnout is a global concern, with moderate to severe levels reported among medical students worldwide (5). In the Indian context, a staggering 71% of medical students reported moderate levels of burnout (6).Studies on Indian medical students have shown that factors linked to the classroom are more stressful than stressors related to interpersonal relationships (7).

Burnout is often associated with high-pressure work environments, heavy workloads, a lack of control, unclear expectations, and a lack of social support. It can lead to a range of physical and mental health issues, including fatigue, insomnia, anxiety, depression, and a weakened immune system (8). Healthcare practitioners (HCPs), including doctors, trainees, nurses, and other professionals, are at heightened risk of burnout due to continuous exposure to significant work-related stress. This is a critical issue, as these professionals collectively address diverse health-related needs in society (9).

Several inventories have been used to study job-related burnout, which is common in the general population (10), and the Maslach Burnout Inventory (MBI) is an extensively reported tool in the burnout literature (11). According to a systematic review comparing the MBI and CBI, the latter inventory is as good as or more sensitive than the MBI in evaluating burnout levels among healthcare workers and students (12). There are several specifically created and tested instruments to study burnout among students, such as the Maslach Burnout Inventory Student Survey (MBI-SS), the Copenhagen Burnout Inventory–Student Survey (CBI-SS), and the Oldenburg Burnout Inventory–Student Survey (OLBI–SS) (13). The Copenhagen Burnout Inventory–Student Survey (CBI-SS) is more reliable and accurate in assessing student burnout (14). The CBI-SS is considered a comprehensive tool for assessing burnout because it considers various aspects of the work environment and an individual's experiences. Owing to its widely accepted reliability, easy accessibility, ease of use, and understandability, it was utilized for this study (15–17).

No previous studies have reported the psychometric properties of the CBI-SS for allied health science and dental students; this study aims to fill this gap by examining its reliability, validity, suitability, and effectiveness in the Indian context. The current study addressed the need for a dependable and valid instrument for assessing burnout levels among health professional students. The study was planned to establish the reliability and validity of the CBI-SS, specifically for allied health professionals, dental undergraduates, and postgraduate students.

## Material & Methods

### *Design and setting(s)*

The study design adopted was a cross-sectional survey among the students registered for the Undergraduate (UG) and Postgraduate (PG) programs in the Faculty of Dental Sciences (FDS) and the Faculty of Life and Allied Health Sciences (FLAHS) from a state private university. The study was initiated in January 2022, from conceptualizing to data collection, and was completed with data analysis in December 2022.

### *Participants and sampling*

All 799 students enrolled in the academic year during the data collection period were included in the study. Of this cohort, 407 were from the FDS, and 397 were from the FLAHS. They were invited to participate in the study via email. All the students willing to participate in the survey obtained written consent. Given that the entire population was considered, determining a sample size was not applicable.

### *Tool/instruments*

The CBI-SS is a 25-item inventory developed by Campos et al. (17) based on the original CBI (18). The student survey has been translated into different languages and tested on over 15 different groups of students and countries for its psychometric properties (15). As the English version of the CBI-SS (17) was available, it was directly utilized for the study. Since the tool was tested for psychometric properties in different countries and not in the Indian context and due to differing academic and cultural perspectives, it was planned to be subjected to psychometric analysis before it was used to assess student burnout. Data analysis was performed via Microsoft Excel 2007 and JMP software Pro16 (license number: 70285774), with statistically significant differences acceptable at a p-value of less than 0.05. The English versions of the CBI-SS were subjected to content validation, face validation, reliability, and construct validity.

The constitution of the subject expert committee validated the tool. For the purpose of content validity, a

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seven-member expert committee consisting of subject experts from allied health science, health profession education, and dentistry was created. Eight students and the expert committee were also requested to participate in face validity.

Content validity was assessed by applying Lawshe's method with expert committee members' input. For face validity, the expert and student committees assessed the tool for idiomatic equivalence, practicality, and feasibility.

### *Data collection methods*

After content and face validity analysis, the Copenhagen Burnout Inventory Student Survey (CBI SS) was administered on the Google platform to all students according to the inclusion criteria. After a fortnight, a reminder email was sent to the students. The total duration of data collection was four weeks.

### *Data analysis*

The mean scores of the CBI-SS items were computed and evaluated via descriptive and inferential statistics. Every analytical method was based on a description previously published in the literature detailing the translation and modification of the CBI-Thai version (15).

Internal consistency was assessed via the computed standardized Cronbach's alpha coefficient. Fit indices such as the Kaiser–Meyer–Olkin test (KMO) and Bartlett sphericity tests were considered for Exploratory Factor Analysis (EFA). Further factor analysis was performed to confirm the variables under each construct. The present research also focused on verifying the constructs for the set of variables observed to test whether a relationship exists between the observed variables and the constructs. Hence, the scale was subjected to Confirmatory Factor Analysis (CFA) with relevant fit indices such as the degree of freedom, Tucker Lewis Index (TLI), freedom ratio ($\chi^2$/df), Goodness-of-Fit Index (GFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Normed Fit Index (NFI). When the CFI, TLI, NFI, and GFI values are more significant than 0.90, and the RMSEA value is less than 0.10 (19), the model shows a suitable fit via JMP (Microsoft Windows) software.

## Results

### *Content validity*

Content validity was assessed by applying Lawshe's method. According to Lawshe's method, for seven subject matter experts (SMEs), the acceptable CVR is 0.9. Only 19 items had acceptable CVRs. Items 5, 6, 15, 18, 23, and 25 had CVRs <1. However, it was decided to consider all the items, as the researchers felt they were important and relevant (**Appendix 1**)

### *Face validity*

The tool was validated for idiomatic equivalence by both the expert committee and eight students. Neither group made observations. Semantic equivalence: The expert committee suggested replacing the word 'colleagues' with classmates or batchmates; hence, items nos. 14 to 19 were revised accordingly (section D). The expert committee also suggested adding 'work on assignments given by teachers' instead of 'work with teachers.' However, the researchers discussed themselves and agreed that retaining the original version statement as the word assignment would limit the understanding of the question to 'related to assignments' only. Similarly, the expert committee also commented on item no. Six, 'How often do you feel weak and susceptible to illness?' could be interpreted in different ways, as there could be some other reason for this and hence might be misleading. The researchers agreed to retain the original version of the statement, as the preamble clearly stated that all the tool items were related only to academics.

The survey was completed by 416 UG and 107 PG students, with an aggregate response rate of 65.45%. **Table 1** shows the baseline characteristics of the respondents and response rates for the different categories of students.

### *Reliability*

Internal consistency was evaluated using the total scale and subscale reliability analysis reflected by Cronbach's alpha coefficient. The alpha values for individual items ranged between 0.7 and 0.8 (Table no. 3). The total alpha score was 0.9, indicating good reliability. The alpha score was also calculated for the tool after factor analysis (FA) (25 items and reorganizing on factor loading) and was found to be 0.9 for all items. The corrected item-total correlation was carried out after FA and showed good discrimination (**Appendix 2**).

Construct validity was established via EFA. This resulted in Kaiser–Meyer–Olkin (KMO) values greater than 0.9 for all the items, indicating sampling adequacy and a Bartlett test of sphericity, with a chi-square value of8880.727 for df 300 and p<0.0001. Thus, there is a substantial correlation in the data with sampling adequacy and correlation between the items.

Factor Analysis: The results of the maximum likelihood EFA with oblimin rotation revealed the presence of four

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main factors with an eigenvalue greater than 1 (**Figure 1** and **Appendix 3**).

**Table 1.** Baseline characteristics and response rates (n = 523)

| Variables | Number |
|---|---|
| Age | |
| (Years) mean± (range) | 22±2 (18-28) |
| Gender | |
| Female | 393 |
| Male | 130 |
| Program | |
| **Dental** – total responders | 256 |
| UG | 214 |
| PG | 42 |
| Response rate (%) | 407/256 (62.90%) |
| **Allied Health**-total responders | 267 |
| UG | 213 |
| PG | 54 |
| Response rate (%) | 397/267 (67.25%) |
| Aggregate response rate (Dental+ FLAHS) | 799/523 (65.45%) |

**Note:** The response rates were calculated based on the total number of respondents in each program. Data are presented as mean ± standard deviation for age, with the range indicating the minimum and maximum ages of participants.
**Abbreviations:** FLAHS, faculty of life and allied health sciences; UG, undergraduate; PG, postgraduate.

Based on the factor loading, the items under each domain were revised, resulting in seven items for the domain on Personal Related Burnout (PRB), five items for Studies Related Burnout (SRB), six items for Colleague Related Burnout (CRB) and six items for Teacher Related Burnout (TRB). Hence, based on factor loading scores that led to the shifting of items from the study-related construct to the personal-related construct, the scale was subjected to CFA with model fit indices such as the Tucker and Lweis indices, which had a score of 0.919 and an RMSEA value of 0.068, indicating adequate model fit. The CBI scores were calculated according to Kristens' criteria. Each item was allotted five options: "always," "frequently," "sometimes," "rarely," and "never." The scores attributed to these options were 4, 3, 2, 1, and 0, respectively, with the total score ranging between 0 and 100.

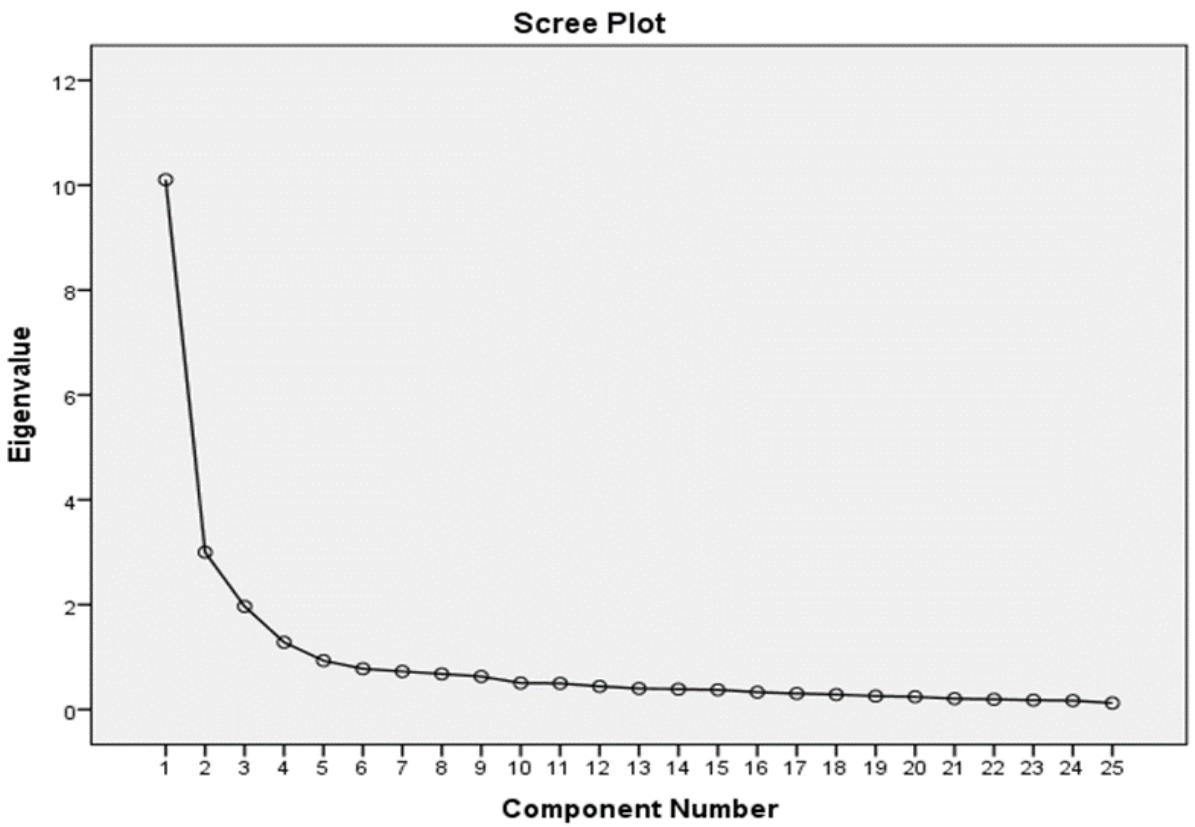



**Figure 1:** Scree plot of the components of the CBI-SS

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Inverse scoring for item 10 was allotted. According to Kristensen's criteria for burnout levels, scores of 50-74 are considered moderate, scores of 75-99 are considered high, and a score of 100 is considered severe burnout (20). For each construct, a total average score was calculated and shown in Tables 5 and 6. The mean total burnout scores when the responses were scored as 4, 3, 2, 1, or 0 are shown in Table 2, and the total mean scores for the UG and PG students are shown in **Table 3**. Since the datasets had skewed values, the scores were calculated based on Kristensen's criteria, as shown in **Table 4**. (20). Our final scores revealed that 11 students experienced severe burnout, 85 in the high category, 296 in the moderate category, and 129 in the low category (**Table 4**). There was no difference between postgraduates among dental and allied health science students regarding constructs scores, with a p-value> 0.05 (**Table 5**). **Appendix 4** shows comprehensive data on the items, scales, and response frequencies.

**Table 2.** Domain-wise and total mean burnout scores for the whole sample (n=523)

| Domain | Mean burnout score | Standard deviation |
|---|---|---|
| **Personal Related** | 17.88 | 0.25 |
| **Study-related** | 12.5 | 0.18 |
| **Colleague related** | 13.3 | 0.19 |
| **Teacher related** | 11.8 | 0.24 |
| **Total CBI** | 55.6 | 0.79 |

**Note:** Descriptive statistics were calculated for each domain and the total burnout score.
**Abbreviations:** CBI, Copenhagen burnout inventory; n, number of participants.

**Table 3.** Domain-wise and total mean burnout scores for UG and PG students

| Domain | UG students (n= 416) Mean ± SD | PG students (n=107) Mean ± SD |
|---|---|---|
| **Personal Related** | 17.6 ± 0.28 | 18.6 ± 6.04 |
| **Study-related** | 12.5 ± 0.2 | 12.5 ± 4.2 |
| **Colleague related** | 13.1 ± 0.21 | 13.88 ± 4.56 |
| **Teacher related** | 11.6 ± 0.26 | 12.5 ± 5.6 |
| **Total Burnout scores** | 55.09 ± 18.04 | 57.5 ± 19.06 |

**Abbreviations:** UG, undergraduate; PG, postgraduate; SD, standard deviation; n, number of participants.

**Table 4.** Distribution of students according to severity of burnout per Kristensen's criteria

| Category | Scores | Number of students | % of students (n=523) |
|---|---|---|---|
| **Severe** | 96-100 | 11 | 2.1 |
| **High** | 73-95 | 85 | 16.25 |
| **Moderate** | 48-72 | 296 | 56.6 |
| **Least** | 0-47 | 129 | 24.66 |

**Table 5.** Total and construct-wise CBI-SS scores among postgraduates in dental and allied health science programs

| Year of Study | n | PRB Mean ± SD | SRB Mean ± SD | CRB Mean ± SD | TRB Mean ± SD | Total burnout Mean ± SD |
|---|---|---|---|---|---|---|
| **FDS** | 42 | 18.9 ± 5.6 | 13.8 ± 4.2 | 14 ± 4.22 | 12.3 ± 5.3 | 59 ± 17.8 |
| **FLAHS** | 65 | 16.8 ± 5.8 | 11.3 ± 3.8 | 12.6 ± 4.4 | 11.3 ± 5.5 | 52.23 ± 18 |

**Note:** The difference in the burnout score between the two groups was not statistically significant.
**Abbreviations:** PRB, personal-related burnout; SRB, study-related burnout; CRB, colleague-related burnout; TRB, teacher-related burnout; SD, standard deviation; n, number of participants.

## Discussion

This study investigated the psychometric properties of the student version of the Copenhagen Burnout Inventory among students of the Faculty of Life and Allied Health Sciences and Dental Sciences at a private university in southern India. The tool demonstrated good reliability, with Cronbach's alpha scores between 0.778 and 0.895 for all four subscales and an overall value of 0.936 for the total scale. These scores are pretty similar to the scores reported in the Portuguese version of the CBI-SS (ranging from 0.875-0.931 for subscales and 0.957 for the total scale) and the Thai version (0.896-0.910 for all four subscales and 0.929 for the total scale) (15, 17).

Exploratory factor analysis revealed KMO values above 0.9, and Bartlett's test revealed chi-square = 8880.727, df = 300, p < 0.0001. The Tucker–Lewis index was 0.919, and the RMSEA was 0.068, which agrees with Yeh et al. (19). This indicates an adequate model fit indicator, with all 25 items retained. These results align with those reported by Oluwydia et al. (21). These findings suggest that our tool was more effective in fitting the sample than the Thai and Brazilian versions were (15, 17).

Factor analysis revealed four factors, namely, personal-related burnout, studies-related burnout, colleague-related burnout, and teacher-related burnout, which indicates that our four-dimensional model fits well with

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the one initially proposed by Campros et al. ( (17) and subsequently confirmed by others (15, 21), with moderate to good interaction correlation between the four subscales. This indicates that the items of the CBI-SS are relatively homogeneous and measure the same overall construct as reported by various researchers (21–23). The high Cronbach's alpha values for each subscale and overall scale indicate that the CBI-SS is a valid tool for assessing burnout in the community of students studying allied health and dentistry science. Four subscales make up the CBI-SS burnout classification, which allows for identifying burnout predictors and developing a suitable action plan for organizing educational experiences and preventive measures that address the burnout-causing factor (24). In this university's student population, we found low study-related stress, probably due to introducing a competency-based curriculum, encouraging regular formative assessments with structured feedback and ongoing assessment, and creating a supportive learning environment. This assumption needs further research.

By adopting this validated tool, our study revealed that 56.60% of the students experienced moderate burnout, and 24.66% experienced low burnout (18). The percentage of students with high/severe burnout scores (16.25%/2.10%) was low. The stress variables connected to personal life were found to be relatively high (UG: 17.6 ± 0.28) (PG: 18.6 ± 6.04), which is closely related to the findings of studies by Dyrbye et al. and Bolatov et al. (24, 25).

While the Maslach Burnout Inventory Student version (MBI-SS) has been used in several studies to measure burnout among medical, dentistry, and nursing students (26,27), we chose to measure burnout via the Copenhagen Burnout Inventory Student Survey (CBI-SS). Although the Maslach Burnout Inventory (MBI) is regarded as the gold standard, as argued by Kristensen et al. (18), burnout is actually about emotional and physical tiredness, raising doubts about the significance of the MBI components, such as job satisfaction and cynicism (16). As Alahmari et al. reported, CBI SS has a slight edge over MBI SS and is extensively used in countries other than America and Europe (12). The Danish National Institute of Occupational Health created the CBI, which measures burnout more accurately than the MBI (17). The instrument circumvents the drawbacks of the MBI and can be used to gauge burnout in people other than service providers. As proposed and verified by Campos et al., the Copenhagen Burnout Inventory–Student Version (CBI-SS) has 25 items grouped into the four dimensions previously described. The cost aspect was another justification for using the CBI-SS. While the MBI-SS can be obtained only through commercial means and requires payment, the CBI-SS is freely accessible for academic purposes and has been widely utilized globally with vital dependability and validity (17, 24).

Our research adds to the assessment of the psychometric qualities of the CBI-SS for the demographic characteristics of Indian university students. Information bias may arise from the use of a self-administered questionnaire. The online survey methods are associated with well-acknowledged subject bias (28), also applicable to our study. Since the study was survey-based, it was impossible to determine whether any additional factors contributed to burnout. Finally, the cross-sectional design adopted for the study limits the ability to determine causal relationships from the data.

## Conclusion

The CBI-SS tool appears to be reliable and valid for identifying burnout among allied health science and dental students. It can also be utilized to plan interventions to address burnout among healthcare professional students. This validated and reliable instrument could be useful for identifying burnout and planning interventions accordingly among healthcare profession students.

## Ethical considerations

The University Ethics Committee (EC-23/164-F-FDS) granted ethical approval. The participants ensured the confidentiality of the data.

## Artificial intelligence utilization for article writing

None

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## Conflict of interest statement

None

## Author contributions

Dr. PK and Dr. MJ: Conceptualization, Methodology, Investigation, Data Analysis, and Interpretation; Writing Original Draft Preparation; Dr. AJ and Mr. AP:

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Conceptualization, Data Collection, Analysis, Writing - Review & Editing. Dr. AT: Tool validation, Data collection, and data analysis. All the authors read and approved the final manuscript.

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## Data availability statement

The corresponding author can provide the datasets analyzed in this study upon request.

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**Appendix 1.** CVR for the CBI tool for seven SMEs

| Item No. | Items | CVR |
|---|---|---|
| 1 | How often do you feel tired? | 1 |
| 2 | How often you are physically exhausted? | 1 |
| 3 | How often you are emotionally exhausted? | 1 |
| 4 | How often do you think: “I can’t take it anymore”? | 1 |
| 5 | How often do you feel worn out? | 0.7 |
| 6 | How often do you feel weak and susceptible to illness? | 0.7 |
| 7 | Do you feel worn out at the end of a working day? | 1 |
| 8 | Do you feel exhausted in the morning at the thought of another day at work? | 1 |
| 9 | Do you feel that every working hour is tiring for you? | 1 |
| 10 | Do you have enough energy for family and friends during your leisure time? | 1 |
| 11 | Are your studies emotionally exhausting? | 1 |
| 12 | Are your studies emotionally exhausting? | 1 |
| 13 | Does your studies frustrate you? | 1 |
| 14 | Do you feel burned out because of your studies? | 1 |
| 15 | Do you find it hard to work with colleagues/classmates? | 1 |
| 16 | Does it drain your energy to work with colleagues/classmates? | 0.7 |
| 17 | Do you find it frustrating to work with colleagues/classmates? | 1 |
| 18 | Do you feel that you give more than you get back when you work with colleagues/classmates? | 1 |
| 19 | Are you tired of working with colleagues/classmates? | 0.7 |
| 20 | Do you sometimes wonder how long you will be able to continue working with colleagues/classmates? | 1 |
| 21 | Do you find it hard to work with teachers? | 1.28 |
| 22 | Does it drain your energy to work with teachers? | 1 |
| 23 | Do you find it frustrating to work with teachers? | 1 |
| 23 | Do you feel that you give more than you get back when you work with teachers? | 0.7 |
| 24 | Are you tired of working (work on assignments given by teachers) with teachers? | 1 |

**Abbreviations:** SMEs, subject matter experts; CBI, Copenhagen burnout inventory; CVR, content validity ratio.

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**Appendix 2.** Reliability scores of the tool before and after Factor Analysis, depicted as Cronbach's alpha scores

| Alpha scores before FA | | | Alpha score after FA | | |
|---|---|---|---|---|---|
| **Inventory** | **Item-total correlation** | **Cronbach's alpha** | **Inventory** | **Item-total correlation** | **Cronbach's alpha** |
| **CBI-SS** | | 0.936 | CBI-SS | | 0.937 |
| **Personal burnout** | | 0.778 | Personal burnout | | 0.933 |
| **Item-1** | 0.934 | | Item-1 | 0.935 | |
| **Item-2** | 0.934 | | Item-2 | 0.935 | |
| **Item-3** | 0.934 | | Item-3 | 0.935 | |
| **Item-4** | 0.933 | | Item-4 | 0.933 | |
| **Item-5** | 0.933 | | Item-5 | 0.933 | |
| **Item-6** | 0.935 | | Item-6 | 0.935 | |
| | | | Item-7 | 0.934 | |
| | | | Item-8 | 0.933 | |
| **Study related burnout** | | 0.769 | Study related burnout | | 0.933 |
| **Item 7** | 0.933 | | Item-9 | 0.933 | |
| **Item-8** | 0.933 | | Item 10 | 0.938 | |
| **Item-9** | 0.932 | | Item-11 | 0.933 | |
| **Item-10** | 0.937 | | Item-12 | 0.932 | |
| **Item-11** | 0.932 | 0.865 | Item-13 | 0.931 | |
| **Item-12** | 0.932 | | | | |
| **Item-13** | 0.931 | | | | |
| **Colleague related burnout** | | 0.865 | Colleague related burnout | | 0.933 |
| **Item-14** | 0.933 | | Item-14 | 0.933 | |
| **Item-15** | 0.932 | | Item-15 | 0.932 | |
| **Item-16** | 0.932 | | Item-16 | 0.932 | |
| **Item-17** | 0.934 | | Item-17 | 0.935 | |
| **Item-18** | 0.932 | | Item-18 | 0.933 | |
| **Item-19** | 0.933 | | Item-19 | 0.933 | |
| **Teacher related burnout** | | 0.895 | Teacher related burnout | | 0.932 |
| **Item-20** | 0.932 | | Item-20 | 0.932 | |
| **Item-21** | 0.932 | | Item-21 | 0.932 | |
| **Item-22** | 0.931 | | Item-22 | 0.932 | |
| **Item-23** | 0.934 | | Item-23 | 0.934 | |
| **Item-24** | 0.932 | | Item-24 | 0.933 | |
| **Item-25** | 0.933 | | Item-25 | 0.933 | |

**Note:** Cronbach's alpha scores reflect the internal consistency of the inventory and its components before and after factor analysis. An alpha score above 0.7 is generally considered acceptable for reliability.
**Abbreviations:** FA, factor analysis.

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**Appendix 3.** Matrix of factor weights from the EFA of the CBI-SS by the oblimin rotation method with rotated factor loading

| Items | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
|---|---|---|---|---|
| **Do you find it hard to work with teachers?** | 0.846 | | | |
| **Does it drain your energy to work with teachers?** | 0.846 | | | |
| **Do you find it frustrating to work with teachers?** | 0.82 | | | |
| **Do you feel that you give more than you get back when you work with teachers?** | 0.817 | | | |
| **Are you tired of working with teachers?** | 0.804 | | | |
| **Do you sometimes wonder how long you will be able to continue working with teachers?** | 0.765 | | | |
| **How often do you feel tired?** | | 0.79 | | |
| **How often are you physically exhausted?** | | 0.78 | | |
| **How often are you emotionally exhausted?** | | 0.699 | | |
| **How often do you think: "I cannot take it anymore"?** | | 0.697 | | |
| **How often do you feel worn out?** | | 0.684 | | |
| **How often do you feel weak and susceptible to illness?** | | 0.658 | | |
| **Do you feel worn out at the end of the working day?** | | 0.625 | | |
| **Are you exhausted in the morning at the thought of another day at work/college?** | | 0.522 | | |
| **Do you find it hard to work with colleagues/batchmates?** | | | 0.826 | |
| **Does it drain your energy to work with colleagues/batchmates?** | | | 0.815 | |
| **Do you find it frustrating to work with colleagues/batchmates?** | | | 0.806 | |
| **Do you feel that you give more than you get back when you work with colleagues/batchmates?** | | | 0.797 | |
| **Are you tired of working with colleagues/batchmates?** | | | 0.687 | |
| **Do you sometimes wonder how long you will be able to continue working with colleagues/batchmates?** | | | 0.635 | |
| **Do you find it hard to work with colleagues/batchmates?** | | | | 0.775 |
| **Does it drain your energy to work with colleagues/batchmates?** | | | | 0.743 |
| **Do you find it frustrating to work with colleagues/batchmates?** | | | | 0.731 |
| **Do you feel that you give more than you get back when you work with colleagues/batchmates?** | | | | 0.556 |
| **Are you tired of working with colleagues/batchmates?** | | | | 0.509 |

**Note:** Factor loadings greater than 0.50 are shown in bold to indicate significant contributions to the respective factors.
**Abbreviations:** EFA, exploratory factor analysis; CBI-SS, Copenhagen burnout inventory–student survey; n, number of participants.

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**Appendix 4.** Copenhagen Burnout Inventory (CBI): Scales, items and response frequencies

| Response category | Always or to a very high degree (%) | Often or to a high degree (%) | Sometimes or somewhat (%) | Seldom or to a low degree (%) | Never/almost never or to a very low degree (%) | Mean (SD) |
|---|---|---|---|---|---|---|
| **Scoring** | **100** | **75** | **50** | **25** | **0** | |
| **Personal Burnout** | | | | | | |
| How often do you feel tired? | 4.1 | 24.4 | 50.9 | 17.7 | 15 | 22.42 (17.5) |
| How often are you physically exhausted? | 3.9 | 18.9 | 49.5 | 23.6 | 4.1 | 20 (18.6) |
| How often are you emotionally exhausted? | 6.1 | 26.3 | 38.9 | 23.4 | 5.3 | 20 (14.2) |
| How often do you think: "I cannot take it anymore"? | 3.5 | 15.7 | 34 | 31.8 | 14.9 | 19.98 (12.7) |
| How often do you feel worn out? | 3.5 | 13.6 | 39.5 | 32 | 11.4 | 20 (15.09) |
| How often do you feel weak and susceptible to illness? | 2.8 | 7.3 | 34.6 | 43.6 | 11.8 | 20.02 (17.9) |
| Do you feel worn out at the end of the working day? | 8.3 | 22.2 | 41.8 | 22 | 5.7 | 20 (14.4) |
| Are you exhausted in the morning at the thought of another day at work/college? | 4.5 | 20.2 | 32.4 | 29.5 | 13.4 | 20 (11.4) |
| **TOTAL SCORE** | | | | | | **20.3 (2.4)** |
| **Studies (Academic) related to burnout** | | | | | | |
| Do you feel that every working hour is tiring for you? | 2.8 | 5.9 | 29.7 | 37.5 | 24.2 | 20.02 (15.1) |
| Do you have enough energy for family and friends during leisure time? | 23.6 | 20.6 | 30.1 | 21 | 4.7 | 20 (9.3) |
| Is your studies emotionally exhausting? | 6.1 | 10.2 | 34 | 31.4 | 18.3 | 20 (12.4) |
| Does your studies frustrate you? | 5.9 | 8.8 | 33 | 31.8 | 20.4 | 19.98 (12.5) |
| Do you feel burnt out because of your studies? | 5.3 | 9.8 | 33 | 29.7 | 22.2 | 20 (12.1) |
| **TOTAL SCORE** | | | | | | **20 (1.8)** |
| **Colleagues related burnout** | | | | | | |
| Do you find it hard to work with colleagues/batchmates? | 2.2 | 6.5 | 21.8 | 32.8 | 36.7 | 20 (15.3) |
| Does it drain your energy to work with colleagues/batchmates? | 2 | 5.9 | 21 | 33.8 | 37.3 | 20 (15.9) |
| Do you find it frustrating to work with colleagues/batchmates? | 1.6 | 4.9 | 20 | 33.8 | 39.7 | 20 (16.9) |
| Do you feel that you give more than you get back when you work with colleagues/batchmates? | 7.7 | 11.6 | 30.6 | 28.3 | 21.8 | 20 (10.07) |
| Are you tired of working with colleagues/batchmates? | 1.6 | 4.9 | 20 | 30.3 | 43.2 | 20 (17.3) |
| Do you sometimes wonder how long you will be able to continue working with colleagues/batchmates? | 3.5 | 4.1 | 25.9 | 31 | 35.4 | 19.98 (15.1) |
| **TOTAL SCORE** | | | | | | **19.9 (2.63)** |
| **Teachers related Burnout** | | | | | | |
| Do you find it hard to work with teachers? | 3.5 | 5.5 | 24.6 | 31 | 35.4 | 20 (14.6) |
| Does it drain your energy to work with teachers? | 3.5 | 4.3 | 21 | 34.8 | 36.3 | 19.98 (15.8) |
| Do you find it frustrating to work with teachers? | 2.9 | 4.7 | 18.3 | 30.8 | 43.2 | 19.98 (17.2) |
| Do you feel that you give more than you get back when you work with teachers? | 4.7 | 5.7 | 20.2 | 28.1 | 41.3 | 20 (15.4) |
| Are you tired of working with teachers? | 2.9 | 2.8 | 16.1 | 28.7 | 49.5 | 20 (19.6) |
| Do you sometimes wonder how long you will be able to continue working with teachers? | 4.9 | 3.1 | 19.3 | 28.9 | 43.8 | 20 (17.02) |
| **TOTAL SCORE** | | | | | | **19.9 (1.76)** |
| | 10.7 (7.1) | 29.6 (9.4) | 29.8 (5.3) | 25.4 (14.3) | 4.8 (4.1) | |

**Note:** The Copenhagen Burnout Inventory (CBI) measures the degree of burnout in different domains. The responses are categorized into five levels of frequency. Mean and standard deviation (SD) are provided for each item and total score.

**Abbreviations:** CBI, Copenhagen burnout inventory; SD, standard deviation.

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