Burnout syndrome among medical students in Kazakhstan

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Abstract

This study aims at investigating burnout and associated factors in a sample of medical students from Astana Medical University (AMU), using the Russian version of the Copenhagen Burnout Inventory - Student Survey (R-CBI-S), which was validated in the current study. 771 medical students responded. The study included socio-demographic and personal questions, and a tool to measure burnout. Statistical analyses included test-retest reliability, internal consistency, item analysis, confirmatory factor analysis for validation and measures of descriptive statistics, and logistic regression analysis for evaluating burnout. The R-CBI-S demonstrated good reliability and validity. The test-retest reliability showed an ICC of 0.81. Cronbach's alpha coefficient was 0.94. R-CBI-S achieved good levels of goodness-of-fit indices (RMSEA = 0.0611; CFI = 0.940; TLI = 0.933). Overall, 28% of medical students reported burnout; R-CBI-S mean score was 40. There is no significant gender difference in burnout. On regression analysis, to be a 2nd year student, compare to dormitory students live at home or rented a house, having suicidal ideation, having thoughts of dropping out, having interpersonal relationship problems with family or friends, smoking, using alcohol were independently associated with increased risk for burnout. Enrolling in a medical university by its own decision and having satisfaction with academic performance associated with a decreasing of developing burnout syndrome. In conclusion, the test results indicated the R-CBI-S scale appears to be a reliable and valid instrument. Factors associated with burnout were identified.

Introduction

Burnout is a growing epidemic among medical students that has been shown to have psychological and performance-related detriments [1]. Medical students are not only more likely to be burned out compared to the general population, but are increasingly likely to suffer burnout as they advance in their medical training [2,3]. This often leads to significant psychological changes that manifest as depression, insomnia, substance abuse disorders, poor physical health, psychosomatic conditions, relational problems, social withdrawal, and professional dysfunction [4,5]. Burnout can also affect medical students' will to continue to espouse professional qualities, such as honesty, integrity, altruism, and self-regulation [6]. Based on these findings, it is clear that burnout is a serious problem in the training and professional development of medical students.

Several methods have been developed to study burnout among students, namely the Maslach Burnout Inventory - General Survey for Students (MBI-SS), the Oldenburg Burnout Inventory for college students (OLBI-S), and the Copenhagen Burnout Inventory (CBI) proposed by Kristensen et al [7]. The MBI-SS assesses the prevalence of burnout based on subjects' emotional exhaustion, depersonalization and reduced professional satisfaction and effectiveness as captured by 22 items. OLBI-S includes two dimensions, such as exhaustion and disengagement, with the distinction that it captures exhaustion across physical, affective, and cognitive dimensions compared to the single emotional dimension measured by MBI-SS [8]. By comparison, CBI focuses only on fatigue/emotional exhaustion, but measures the respondent's attribution of this exhaustion to three different life domains: Personal Burnout, Work-related Burnout, and Client-related Burnout [7]. Campos et al. adapted the CBI original inventory for

students as CBI-Student Survey, and developed items measuring student's Personal Burnout, Studies-related Burnout, Colleague-related Burnout, and Teacher-related Burnout [9].

This study aims at evaluating the reliability and validity of the Russian version of the Copenhagen Burnout Inventory - Student Survey (R-CBI-S) in a sample of medical students of the Astana Medical University, Kazakhstan, and investigating burnout prevalence and related factors. To the best on our knowledge, this is the first study of burnout among medical students in Kazakhstan.

Materials And Methods

Participants and Procedure

All medical students at any stage of medical education at Astana Medical University were eligible to participate. Participants were invited via the "messengers" app and the university's information portal, Sirius, to fill out an online questionnaire created on the 1ka platform (www.1ka.si) during the period October 2019 – December 2019. 771 completed the questionnaire (response rate 40%). The mean age of the respondent was 20.7 years (18–33). Table 1 presents baseline socio-demographic and personal data of participants.

The Copenhagen Burnout Inventory - Student Survey was converted into the Russian language from the original English version using a forward-backward translation process performed by specialists in the field of psychology and language. The final questionnaire was revised based on the feedback from a sample of 20 participants through a pilot study.

Materials

The questionnaire included:

- Items on socio-demographic and personal characteristics (age, sex, year in medical school, accommodation, part-time job, extracurricular activities, suicidal ideation, thoughts of dropping out, relationship problem with family and friends, satisfaction with academic performance, cigarette and alcohol use), and
- The Russian version of the Copenhagen Burnout Inventory adapted for students. The R-CBI-S consists of 25 items that represent four dimensions: Personal Burnout (PB) – 6 items (numbers 1, 2, 3, 4, 5, and 6), Studies-related Burnout (SRB) – 7 items (numbers 7, 8, 9, 10, 11, 12, and 13), Colleague-related Burnout (CRB) – 6 items (numbers 14, 15, 16, 17, 18, and 19), and Teacher-related Burnout (TRB) – 6 items (numbers 20, 21, 22, 23, 24, and 25). The answers that can be given to each item are "always," "frequently," "sometimes," "rarely," and "never." The scores attributed to these answers are 100, 75, 50, 25, and 0% respectively, with inverse scoring for item 10. For each scale, it has calculated a total average score. According to Kristenson's criteria of burn out levels scores of 50 to 74 are considered moderate, 75–99 are high, and a score of 100 is considered severe burnout [10].

The study was approved by the Local Ethics Committee of AMU (extract from protocol No. 3 of September 20, 2018).

Data analysis

Data analysis was conducted using Microsoft Excel 2007, SPSS version 20.0, and Jamovi version 1.2.17. A statistically significant difference was accepted at a p-value of less than 5%.

The reliability of the scale (performed on a sample of 20 subjects during a two-week interval) was evaluated using the interclass correlation coefficient (ICC). The acceptable score of ICC is above 0.70.

Internal consistency was evaluated by the total scale and subscales reliability analysis reflected by Cronbach's alpha coefficient. Cronbach's alpha coefficient with a value of ≥ 0.7 is acceptable. Corrected item-total correlation was carried out.

Construct validity was established by the confirmatory factor analysis (CFA) technique, with Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy used to test the dataset for factor analysis suitability. The CFA is used to assess the overall goodness of fit: the Root Mean Square of Error Approximation RMSEA (< 0.08); the Comparative Fit Index CFI (> 0.9) and Tucker-Lewis Index TLI (> 0.9).

The criterion validity was assessed by receiver operating characteristic (ROC) curves of additional question: "How burned out do you feel from your course?". It was scored on a five-point Likert-scale with 1 = "not at all", 2 = "very little", 3 = "a little", 4 = "some", and 5 = "very". Scores 4 and 5 were coded as burnout. The area under the curve (AUC) of the ROC curve, with values ranging from 0 to 1, measured the diagnostic effectiveness of the survey in detecting individuals who were affected by burnout.

Descriptive statistics were performed using mean and confidence intervals (95% CI) for quantitative variables. Percentages were computed for qualitative variables. We performed forward χ^2-test and logistic regression to evaluate independent associations of the independent variables with burnout.

Results

The final translated Russian version of the R-CBI-S is presented in Electronic Supplementary Material 1 (ESM1).

The test-retest reliability showed an ICC of 0.81 (CI 95% 0.63−0.94) for the R-CBI-S. The overall Cronbach's alpha coefficient of the R-CBI-S was 0.939 (0.896 for PB, 0.884 for SRB, 0.874 for CRB, and 0.926 for TRB), which indicates a high level of internal consistency. Corrected item-total correlation is shown in ESM1. All item-total correlations for the total scale were positive (range 0.31−0.76).

The Barlett's sphericity test result was significant ($p < 0.001$), and the KMO measure of sampling adequacy exceeded 0.947. According to the CFA analysis, the model fit of the four-factor R-CBI-S model was confirmed by the indices: $\chi^2/df = 3.881$; RMSEA = 0.0611; CFI = 0.940; TLI = 0.933 (in compare one-factor model showed $\chi^2/df = 17.963$; RMSEA = 0.148; CFI = 0.638; TLI = 0.605). Figure 1 shows the factor model.

The criterion validity was measured by the number of respondents who answered 4 (some) or 5 (very) to question "How burned out do you feel from your course?" This resulted in an AUC of 0.880 (0.856−0.905) for PB, 0.947 (0.932−0.961) for SRB, 0.681 (95% CI 0.643−0.718) for CRB and 0.829 (95% CI 0.801−0.858) for the TRB dimension. For the total R-CBI-S score, the AUC was 0.934 (95% CI 0.918−0.950) (Figure 2).

The total R-CBI-S mean score was 39.96, and mean subscale scores for this sample were 52.62 (PB), 50.93 (SRB), 23.50 (CRB), and 32.77 (TRB). However, it is more important to study the overall prevalence of students reporting moderate, high, and severe burnout. On the PB subscale 40.99% of students reported moderate burnout, 15.56% reported high burnout, and 2.08% of participants scored 100 indicating severe personal burnout. The overall prevalence of students reporting moderate studies-related burnout was 35.93%. 18.93% of students reported high levels of burnout, and 0.78% severe studies-related burnout. On the CRB 9.47% of students reported moderate, 2.33% high and 0.91% severe. The prevalence of students reporting moderate TRB was 18.29%, while 4.93% of respondents reported high levels, and 1.94% reported severe TRB. The distribution of the burnout syndrome severity by total R-CBI-S scoring was as follows: No\Low − 72%, moderate − 25.4%, high − 2.5%, and severe − 0.1%.

A relationship testing by χ^2-test (Table 2) reveals that the prevalence of PB was significantly higher ($p < 0.05$) in women and in students with an additional part-time job. Furthermore, students with extracurricular activities like participation in scientific clubs, student societies, and volunteering comparison to students without any activities show higher prevalence of CRB than their non-participant student counterparts. Participants with positive answers for the following questions had a significant more expressed burnout in total and for all dimensions: suicidal ideation, thoughts of dropping out, interpersonal relationship problems with family/friends, satisfaction with academic performance, and alcohol using. In addition, cigarettes smoking students were more prone to PB, SRB, and TRB.

Dormitory students demonstrate lower personal (48.28 vs 54.38, $p < 0.05$), studies-related (45.23 vs 52.82, $p < 0.05$) and total burnout (36.31 vs 41.04, $p < 0.05$) than students living at home. Moreover, students living in a dormitory had a lower level of studies-related burnout compared to students who occupy non-student housing (45.23 vs 50.91, $p < 0.05$).

Students who reported entering medical school by their own choice were found to have significantly lower levels of burnout (37.8, 95% CI 36.6−39.1) than students who chose medical education for other reasons (49, 95% CI 42.8−55.3), including those for whom the decision to study medicine was made by their parents or other close relatives (48.5, 95% CI 45.4−51.5), $p < 0.001$.

In Table 1, logistic regression analysis revealed that seven variables were significantly associated with an increased likelihood of having burnout: being in one's second year of study (OR = 2.25, p < 0.001); living at home or in a rented dwelling (OR = 1.89 and 1.47 respectively), p = 0.021; having suicidal ideation (OR = 7.79, P < 0.001); having thoughts of dropping out (OR = 6, p < 0.001); having interpersonal relationship problems with family or friends (OR = 2.84, p < 0.001); smoking (OR = 2.26, p = 0.003); using alcohol (OR = 1.77, p < 0.001). Two variables were significantly associated with a decrease in burnout: enrolling in a medical university by one's own decision (OR = 0.18, p < 0.001); and expressing satisfaction with one's academic performance (OR = 0.31, p < 0.001).

Discussion

The purpose of this study was to examine the psychometric properties of the Russian version of CBI-S. Following adaptation and psychometric tests, this study found that the survey was reliable and valid for assessing burnout among Russian-speaking medical students in Kazakhstan. The ICC analysis showed that the R-CBI-S had high stability within 2 weeks of the test-retest approached (mean ICC 0.81).

The internal consistencies of the four subscales were satisfactory, with all the Cronbach's alpha values ranging from 0.874 to 0.926, and Cronbach's alpha for R-CBI-S being 0.939. These results are slightly lower than those reported by Campos et al., with Cronbach's alpha ranging from 0.875 to 0.931, and 0.957 for CBI-S. The results of the current study present good internal consistency values. The corrected item-total correlation values obtained for the items are relatively high, which demonstrated that the items of R-CBI-S are relatively homogeneous and are measuring the same overall construct.

R-CBI-S demonstrated satisfactory construct validity, as tested by CFA. The results indicated that most fit indices were in acceptable ranges. Sufficiency of the model was demonstrated by Bartlett's test of sphericity and KMO measure.

The criterion validity of the survey was tested on all participants by adding the question "How burned out do you feel from your course?" as the gold standard for burnout. This test showed that the diagnostic efficacy of the survey was high, with an AUC in excess of 0.934. A higher value of SRB AUC than total scale AUC (0.947 and 0.934 respectively) can be explained by the similarity of an additional question with item 13 in the SRB subscale ("Do you feel burned out because of your studies?"). These results demonstrate a high capacity for detecting the students affected by burnout syndrome.

According to the result of psychometric properties testing, the present study shows that the R-CBI-S is a reliable and valid measure for assessing burnout syndrome among Russian-speaking medical students in Kazakhstan. This is a novel finding in that there are no other existing studies that describe burnout and related factors among medical students, or even non-medical students, in Kazakhstan, as a consequence of which authors compared the results by referring to foreign sources.

This study aimed to determine the prevalence of burnout and to identify factors associated with burnout among medical students at AMU. In one systematic review of 24 studies of 17,431 pre-residency medical

students, overall burnout prevalence across the entire student population was estimated to be 44.2% (33.4%–55.0%) [11]. In the current study prevalence of burnout syndrome was 28% (broken down by severity: 25.4% moderate, 2.5% high, and 0.1% severe). Similar medical student burnout rates were found in studies from South and Central America (26%) and Europe (27.5%) [11]. This comparison cannot be reliably interpreted since these countries have different medical education system.

Our study also revealed that while prevalence of burnout was not dependent on gender, women showed significantly higher scores of personal burnout ($p < 0.05$). In a systematic review, Frajerman et al. found no significant association between gender and burnout [11]. In contrast, two systematic reviews of Chinese and Brazilian medical schools found higher levels of burnout in males [12,13]. The burnout prevalence among medical students was also different according to the year of study ($p < 0.001$); burnout rate were higher among students in the second year relative to students in the other years.

Many students during the training period take on additional work for various reasons: to make extra money or, try to improve their practical skills by working as junior medical personnel in clinics. Students doing additional work outside of the required curriculum represented 24% of our respondents. These students were found to have significantly higher prevalence of personal burnout ($p < 0.05$) compared to students who do not have any job.

Some prior research has found that burnout was not associated with different types of extracurricular activities [14,15]. However, it is known that extracurricular activities like those involving music and physical exercise may reduce burnout and other mental health problems [16,17]. In the current study, authors wanted to study the impact of extracurricular activities such as participating in scientific clubs and student societies and volunteering on burnout. We found that students with extracurricular activity had a higher level of colleague-related burnout comparison to students without it ($p < 0.05$).

Among US medical students Dyrbye et al. found that burnout can contribute to suicidal ideation, while recovery from burnout decreases the prevalence of suicidal ideation [18]. Data from the systematic review of Ishak et al. pointed to an association between burnout in medical students and suicidal ideation [19]. Our study found that students with suicidal ideation have more expressed burnout in total and across all studied dimensions ($p < 0.001$). Also, students who had suicidal ideation were almost eight (7.8) times more likely to develop burnout than those who did not have suicidal ideation.

Burnout is known to be associated with serious thoughts of dropping out [20]. In the current study we found the same association: students who report thoughts of dropping out from medical school show significantly higher burnout severity and prevalence ($p < 0.001$). Moreover, we found that students who are not satisfied with their academic performance have more pronounced burnout syndrome ($p < 0.001$). Suicidal ideation and thoughts of dropping out can be described as the manifestation of distress [21].

Salam et al. reported strong relations between stress and interpersonal relationship problems among medical students [22]. Participants of current study indicated the presence of relationship problems with family and friends more prone to burnout.

Substance use seems to play a meaningful role in burnout. 64 out of 480 students (13%) in the present study indicated that they smoke cigarettes. The study found that these students had higher burnout prevalence. Results obtained by Cecil, et al. indicated that being an ex-smoker was significantly predictive of higher emotional exhaustion scores [23]. Also, a study from Japan concluded that the mental health status of dental students among regular smokers was better than that of non-current smokers [24]. One longitudinal survey among German and Chinese students showed healthy lifestyle choices like choosing not to smoke are related to improvements in mental health over a one-year period [25]. On the other hand, a study from South-West Ethiopia indicates that smoking cigarettes was significantly associated with common mental disorders [26]. Alcohol use is also of note in the burnout research. Jackson et al. found that alcohol abuse or dependence was more common among medical students with burnout, high emotional exhaustion, and high levels of depersonalization [27]. Research among British medical students did not find significant correlations between any of the personality variables and alcohol consumption [28]. Cecil et al. reported that increased alcohol binge scores were significantly associated with higher personal accomplishment scores [23]. In this study, we found that higher burnout prevalence is found in students who drink alcohol ($p < 0.001$).

The degree to which students feel to have been empowered to make their own decisions regarding studies and career also seems to influence susceptibility to burnout. We note that the culture of Kazakhstan is distinct from that of more individualistic nations' cultures that heavily promote independence and autonomy of young adults in that it is common for younger generations to strictly obey and yield to the opinions of older relatives. This influence often extends to decisions about which specialty children should pursue at university. In this work, it was found that when admission to a medical school is the decision of the student him/herself, or that he/she believes that it was, then during the study period, the student is likely to reported significantly lower levels of burnout ($p < 0.05$) than student counterparts who chose medical education for other reasons, including the urging of parents and close relatives. Thus we determined that an independent decision of the student to enter a medical school was a strong predictor for burnout development.

Finally, dwelling type plays a meaningful role. We found that compared to medical students who were not burned out, those who screened positive for burnout were more likely to be living at home or rented a house than in student housing. This might suggest there compounding network effects of burnout – that students living among other students might inherit be more likely to burn out themselves. It might also suggest that those living in non-student housing are more likely to have stronger support systems – family, relationship partners, or friends close enough to live with – that function as a burnout preventative.

Limitations

There are several limitations inherent in this study. First, not all means of validation analysis were employed during the study. Only one tool was used to measure burnout. Future studies could extend this work to comparisons using other well-established measures of burnout. Also, the study was conducted in

Astana Medical University, and as such the results might be generalizable to other medical universities in Kazakhstan. Future work could extend this work to other groups of students in different fields across Kazakhstan, or non-student professional populations. Finally, this study stops short of validating the burnout scores with respect to their relationship to other determinants of quality of life, and with professional and life outcomes post-medical school. This limitation provides another fruitful potential avenue for future extension of this work.

Conclusion

The R-CBI-S appears to be a reliable and valid instrument in measuring medical students' burnout. The instrument could be useful for future efforts to develop an effective preventive intervention for burnout syndrome determination among Russian-speaking medical students. Based on the findings presented in this article, it is clear that there is a high prevalence of burnout syndrome among medical students, in a population of Kazakh medical students. There was a significant association between the existence of burnout and student's year of study, accommodation, design to study in medical school, suicidal ideation, thoughts of dropping out, interpersonal relationship problems, satisfaction with academic performance, smoking, and alcohol use. Longitudinal studies are required to further explore and elucidate the patterns of burnout among medical students.

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Ethics approval: The study was approved by the Local Ethics Committee of Astana Medical University (extract from protocol No. 3 of September 20, 2018).

Consent to participate (include appropriate statements): Not applicable

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Tables

Table 1

Characteristics of the study population. Odds Ratio (OR) of factors associated with burnout among medical students

Characteristics (n, %)	Burnout n (%)	p-value	OR (95% CI)
Gender (n = 771)			
Male (193, 25.0)	56 (29.0)	0.721	1
Female (578, 75.0)	160 (27.7)		0.94 (0.65−1.34)
Year in medical school (n = 771)			
1st year (218, 28.3)	43 (19.7)	0.000	0.68 (0.42−1.09)
2nd year (137, 17.8)	60 (43.8)		2.25 (1.33−3.47)
3rd year (125, 16.2)	37 (29.6)		1.16 (0.69−1.94)
4th year (62, 8.0)	15 (24.2)		0.88 (0.45−1.72)
5th year (60, 7.8)	16 (26.7)		1.00 (0.51−1.95)
6th year (169, 21.9)	45 (26.6)		1
Accommodation (n = 771)			
In student dormitory (143, 18.6)	28 (19.6)	0.021	1
Rental housing (193, 25.0)	51 (26.4)		1.47 (0.87−2.49)
At home (435, 56.4)	137 (31.5)		1.89 (1.19−2.99)
Decision to study at a medical school (n = 771)			
Other reason (27, 3.5)	17 (63.0)	0.000	1
Parents' decision (129, 16.7)	53 (41.1)		0.41 (0.17−0.97)
Its own decision (615, 79.8)	146 (23.7)		0.18 (0.08−0.41)
Part-time job (n = 771)			
No (583, 75.6)	158 (27.1)	0.320	0.83 (0.58−1.19)
Yes (188, 24.4)	58 (30.8)		1
Extracurricular activities (n = 771)			
No (483, 62.65) Yes (288, 37.35)	125 (25.9)	0.088	1
	91 (31.6)		1.32 (0.96−1.82)
Suicidal ideation (n = 472)*			

Characteristics (n, %)	Burnout n (%)	p-value	OR (95% CI)
No (395, 83.7)	96 (24.3)	0.000	1
Yes (77, 16.3)	55 (71.4)		7.79 (4.51−13.43)
Thoughts of dropping out (n = 473)*			
No (291, 61.5)	51 (17.5)	0.000	1
Yes (182, 38.5)	102 (56.0)		6.00 (3.94−9.14)
Interpersonal relationship problem (n = 473)*			
No (356, 75.3)	94 (26.4)	0.000	1
Yes (117, 24.7)	59 (50.4)		2.84 (1.84−4.37)
Satisfaction with academic performance (n = 474)*			
No (232, 49.0)	104 (44.8)	0.000	1
Yes (242, 51.0)	49 (20.25)		0.31 (0.21−0.47)
Smoking (n = 480)*			
No (416, 86.7)	122 (29.3)	0.003	1
Yes (64, 13.3)	31 (48.4)		2.26 (1.33−3.86)
Alcohol use (n = 479)*			
No (364, 76.0)	105 (28.8)	0.000	1
Yes (115, 24.0)	48 (41.7)		1.77 (1.14−2.73)
Note.* - Missing responses were excluded from the total before percentages and OR was calculated.			

Table 2

Prevalence of burnout by dimensions

Variables		PB	SRB	CRB	TRB
Gender	Male	49.2	50.3	14.5	29.0
	Female	61.8*	57.4	12.1	23.9
Part-time job	Yes	68.1	60.6	12.5	23.8
	No	55.6*	54.0	13.3	29.3
Extracurricular activities	Yes	56.2	54.5	16.7	26.4
	No	60.0	56.3	10.4*	24.4
Suicidal ideation	Yes	89.6	84.4	24.7	54.5
	No	47.7**	52.9**	10.1**	22.8**
Thoughts of dropping out	Yes	86.3	86.3	18.1	44.5
	No	48.8**	40.9**	8.9*	17.9**
Interpersonal relationship problem	Yes	83.8	70.9	22.2	43.6
	No	56.2**	53.9*	9.6**	23.0**
Satisfaction with academic performance	Yes	51.7	44.6	8.3	18.6
	No	75.0**	72.4**	17.2*	37.9**
Smoking	Yes	78.1	81.2	11.8	43.7
	No	59.9*	54.3**	17.2	25.2*
Alcohol use	Yes	69.6	67.0	19.1	37.4
	No	60.2*	55.2*	10.2*	24.7*
Total		58.6	55.6	12.7	25.2

Note.*$p < 0.05$, **$p < 0.001$, PB = personal burnout, SRB = studies-related burnout, CRB = colleague-related burnout, TRB = teacher-related burnout

Figures
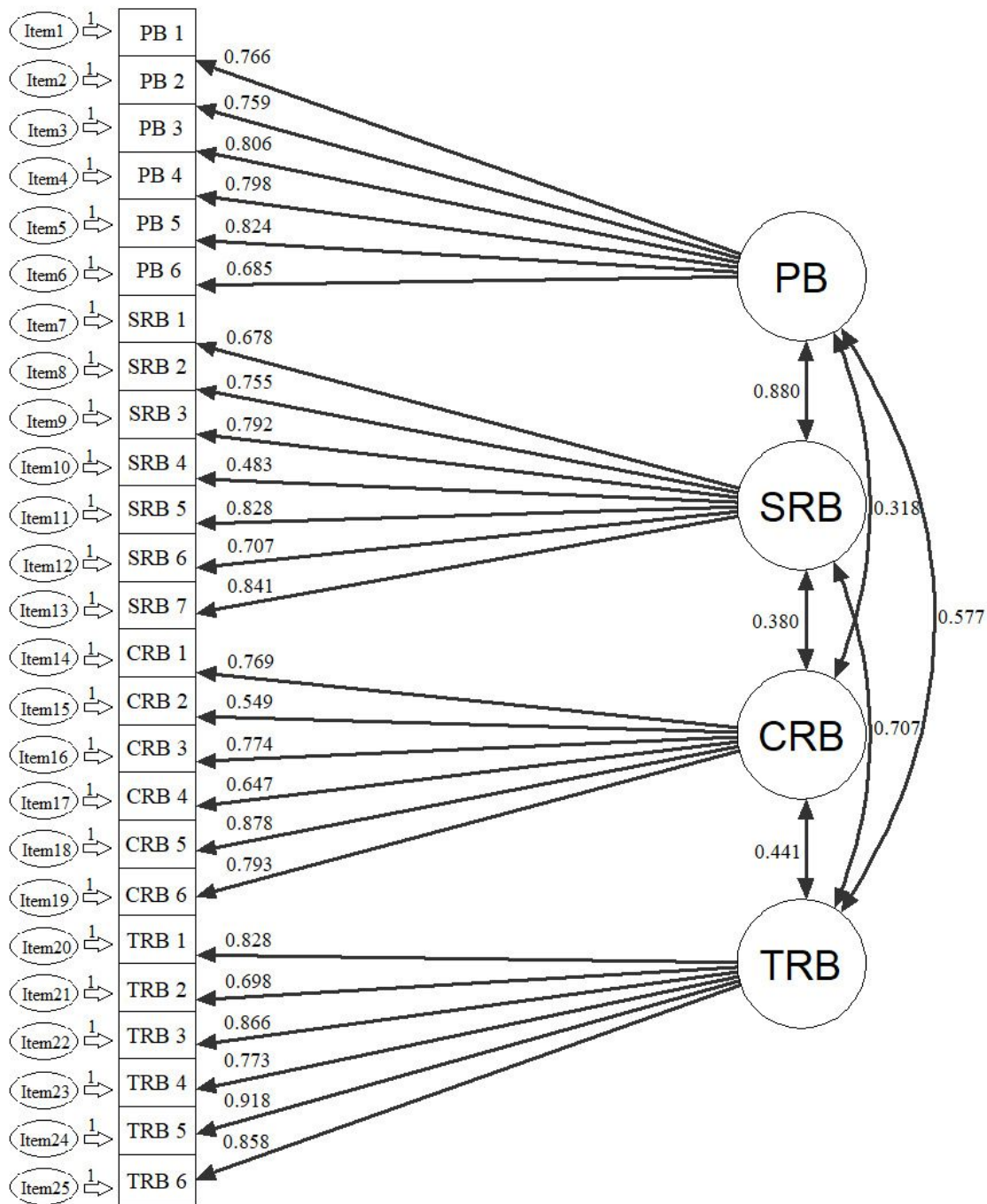
Figure 1

Confirmatory Factor Analysis of the Russian Version of the Copenhagen Burnout Inventory - Student Survey (R-CBI-S) [χ2/df = 3.881; CFI = 0.940; TLI = 0.933; RMSEA = 0.0611]
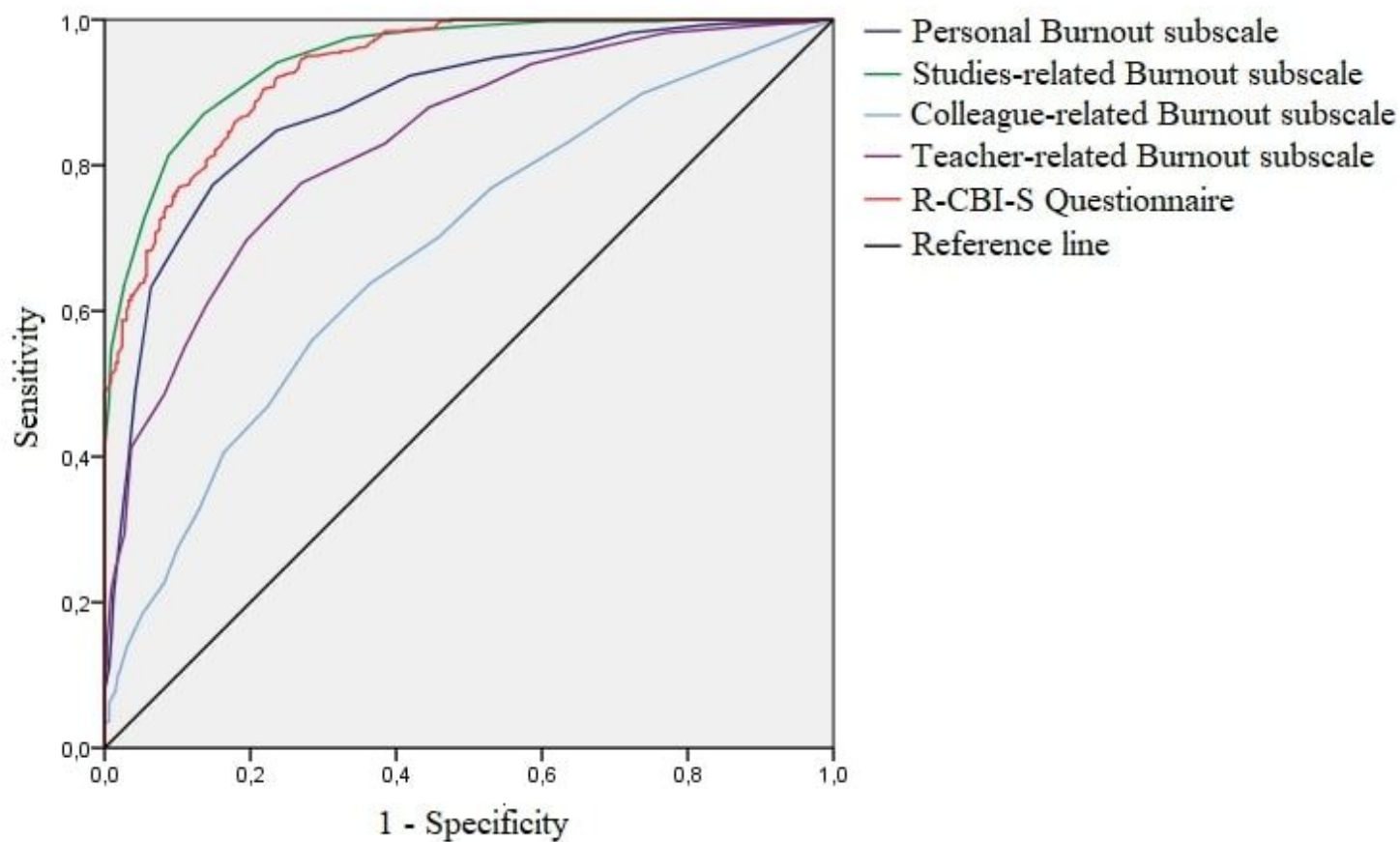
Figure 2

Receiver operating characteristic (ROC) of the Russian version of the Copenhagen Burnout Inventory - Student Survey (R-CBI-S).