Research article

Psychometric properties and development of a structured questionnaire to assess the perception, attitude, and job satisfaction among respiratory therapists

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ABSTRACT

Background: Over the past ten years, significant transformations have occurred in the healthcare landscape, presenting respiratory therapists (RTs) with a mix of challenges and opportunities. Hence, their perceptions about career progression and job satisfaction will be critical factor in determining the recruitment and retention of RTs. However, there are no studies in the literature that comprehensively assessed these aspects using a reliable and valid measure specific to RTs. Our objective was to develop and psychometrically test a Standardized Questionnaire (SQ) for evaluating RT's overall job satisfaction.

Methods: Following consultations with experts and interviews conducted with RTs, a preliminary questionnaire was devised for the purpose of exploratory factor analysis (EFA). The 49 items of the Structured Questionnaire (SQ) were used for verification of the theorized factor structure and content validity using a confirmatory factor analysis (CFA). Principal Component Analysis (PCA), Structural Equation Modeling (SEM), and Confirmatory Factor Analysis (CFA) for the global fit were done. Cronbach's alpha was performed to estimate the internal consistency. The samples of RTs were collected from India between August 2021 and January 2022.

Results: A convenience sample comprising 409 respiratory therapists (RTs) employed in India participated in the survey conducted from June 2021 to January 2022. The exploratory factor analysis revealed three factors that explained 61.2 % of the total variance. The confirmatory factor analysis yielded a 3-factor structure (X2/df = 4.4, p < 0.02, standardized root-mean-square

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residual = 0.05, goodness of fit index = 0.94, comparative fit index = 0.98). The Cronbach's alpha was 0.94 for the total scale.

Conclusions: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) are becoming more prevalent, especially in the development and psychometric evaluation of instruments. This Structured Questionnaire is a reliable and valid tool that has utility for assessing perceptions, satisfaction, and attitude among Respiratory Therapists and for making comparisons of similar psychometric measures.

1. Introduction

The perception of career advancement opportunities and job satisfaction holds significant importance in both attracting and retaining talent within the field of respiratory therapy, mirroring similar concerns found in numerous other professions [1,2]. Yet no one has to date created a questionnaire specifically aimed at evaluating job satisfaction among respiratory therapists (RT's) [3,4]. The subject is central to understanding the importance of finding, hiring and retaining skilled and experienced staff in a healthcare sector that is changing rapidly. Increased emphasis on efficient patient care and safety, diversity of the workforce and modern working environments play a role of growing importance.

Job satisfaction is therefore crucial. Yet to date no accepted Standardized Questionnaire (SQ) has been created to deliver a benchmark definition of job satisfaction within the respiratory therapy (RT) specialization nor how to assess job satisfaction among RT staff. It is the reason why inconsistency remains and the reason why we have developed a structured questionnaire designed to assess once and for all the career perceptions, attitude and job satisfaction of RT's [5]. There are many factors that play a vital role in the job satisfaction of an employee: an appreciation for the work, relationships with colleagues and supervisors; work-life balance; financial stability; opportunities for learning and career development; job security; attractive salary; employers' values and so on [6]. We have condensed these into three principal criteria: perception, attitude, and satisfaction with the workplace and the work itself to create a structured questionnaire and performed factor analysis. The questions are considered important components in staff recruitment and retention in many previous studies conducted among respiratory therapists. Their expertise and RT specialization itself are much in demand, retention and turnover have become increasingly important, particularly after the Covid-19 pandemic hit in March 2020.

Factor analysis (FA) comprises a set of multivariate analytical methods designed to identify a reduced set of latent variables or factors from the observed variables, accounting for the majority of the variance. It encompasses a range of techniques focused on reducing a large set of variables to a more manageable number of factors [5]. There are two types of factor analysis: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Both are based on the common factor model. EFA is utilized in situations where there is limited prior research or understanding of the underlying constructs measured by a specific instrument [7]. In contrast, CFA is primarily employed to validate or refute the proposed underlying structure of a measurement instrument as outlined by a specific theory or extensive research findings. Particularly, its usage is warranted in scenarios where the researcher possesses some understanding of the latent variable structure. Drawing from theoretical insights, empirical evidence, or both, the researcher formulates relationships between the observed measures and the underlying factors beforehand, subsequently subjecting this hypothesized structure to statistical testing [8].

The questions in the SQ are considered as important components in staff recruitment and retention in many previous studies conducted among RTs [9]. With the ever-increasing demand for respiratory therapists (RTs), therapist retention and turnover has become increasingly important particularly after the COVID-19 pandemic hit in March 2020 [10]. The global health crisis has resulted in increased strain on healthcare professionals overall, exacerbated by a severe shortage of adequately trained personnel, leading to adverse psychological effects. RTs in healthcare encounter extended work hours and navigate through a high-stress workplace environment [11]. Numerous respiratory therapists (RTs) have voiced their intention to exit the profession or pursue alternative career paths [12]. Considering these obstacles, we formulated the objective of our research. Given the absence of a dependable and valid instrument for comprehensively measuring job satisfaction domains among respiratory therapists (RTs), it became imperative to devise a tool capable of precisely assessing RTs' overall job satisfaction.

The objectives of this study included: 1) constructing a reliable instrument to assess perceptions, attitudes, and job satisfaction among RTs; 2) assessing the internal structure of this scale in alignment with a coherent conceptual framework through both EFA and CFA; and 3) evaluating the initial psychometric properties of the instrument, such as internal reliability (Cronbach's alpha), construct validity, and content validity.

2. Materials and methods

2.1. Study design

We employed the modified Zhou's Mixed Methods Model of Scale Development. Validation was employed in the creation of a structured questionnaire designed to evaluate the perceptions, attitudes, and satisfaction levels of respiratory therapists [13].

Table 1
Demographical details of the participants.

Characteristic	N = 388 (%)
State	
Karnataka	106 (27.3 %)
Other States	91 (23.5 %)
Kerala	72 (19 %)
Tamil Nadu	64 (16 %)
Telangana	34 (8.8 %)
Maharashtra	21 (5.4 %)
Age	
21–30	342 (88 %)
31–40	37 (9.5 %)
41–50	7 (1.8 %)
Above 50	1 (0.3 %)
Less than 20	1 (0.3 %)
Gender	
Female	238 (61 %)
Male	150 (39 %)
Married	
No	264 (68 %)
Yes	117 (30 %)
Not prefer to say	7 (1.8 %)
Degree	
Bachelor in RT	308 (79 %)
Master in RT	53 (14 %)
Diploma/Advanced Diploma in RT	22 (5.7 %)
On job training	3 (0.8 %)
PhD/Doctoral	2 (0.5 %)
Employment Status	
Full time	361 (93 %)
Not working	20 (5.2 %)
Part time	7 (1.8 %)
Role	
Critical care (ICU and ER)	293 (76 %)
Education/Academic Institution (Assistant Professor, Lecturer, Tutor, Demonstrator etc.)	32 (8.2 %)
Not working	10 (2.6 %)
Outpatient (such as diagnostics and pulmonary rehabilitation)	21 (5.4 %)
Private Clinic (rehabilitation centre, home care centre, sleep clinic)	8 (2.1 %)
Non-critical care (ward and long-term)	6 (1.5 %)
Work in a medical equipment company	4 (1.0 %)
Administration	2 (0.5 %)
Respiratory therapist	2 (0.5 %)
Bronchoscopy	1 (0.3 %)
Entrepreneur	1 (0.3 %)
Hospital setup including (spirometry and advanced spirometry, bronchoscopy, thoracoscopy pulmonary rehabilitation, ICU setup and ward setup)	1 (0.3 %)
Outpatient, non-critical care and critical care.	1 (0.3 %)
PG student	1 (0.3 %)
Pulmonary Rehabilitation freelance	1 (0.3 %)
Pulmonology & critical care	1 (0.3 %)
Student	1 (0.3 %)
Tutor and Respiratory Therapist	1 (0.3 %)
Experience	
1–5 years	226 (58 %)
< one year	93 (24 %)
6–10 years	45 (12 %)
11–20 years	19 (4.9 %)
>20 years	5 (1.3 %)
Working hours	
8 h	224 (58 %)
12 h	90 (23 %)
<8 h	62 (16 %)
>12 h	12 (3.1 %)
Primary shift	
Alternative	194 (50 %)
Day	183 (47 %)
24 hours	8 (2.1 %)
Night	3 (0.8 %)
Monthly income	
20,001–30,000	174 (45 %)
Above 100,000	70 (18 %)

Table 1 (*continued*)

Characteristic	N = 388 (%)
10,000–20,000	64 (16 %)
30,001–40,000	27 (7.0 %)
40,001–60,000	19 (4.9 %)
below 10,000	21 (5.4 %
60,001–100,000	13 (3.4 %)

Note: Percentages may not total 100 due to rounding.

2.2. Participants

With consideration given to the guideline suggesting a sample size of at least eight times the number of items for factor analysis, as well as potential dropout rates, a total of 409 participants were included in the study [14]. As a result of incomplete questionnaires, the final sample comprised 388 participants, with 21 individuals excluded from the analysis. It is crucial to highlight that respiratory therapists who participated in the focus group sessions were not included in the total or refined sample. Demographic characteristics such as present location of work (State/Region base), gender, years of working, average monthly income, education, and marital status we requested to provide. Comprehensive demographic characteristics are provided in Table 1.

2.3. Instruments

Unofficial focus group sessions were conducted with respiratory therapists employed in clinical settings, educational institutions, corporate environments, and those fulfilling roles extending beyond traditional respiratory therapy responsibilities (e.g., clinical application specialists, research assistants, hospital administrators, homecare service providers, etc.). We integrated a semi-structured questionnaire developed from existing literature to facilitate the discussions [15]. This method aimed to strike a balance between fostering open and exploratory dialogue while providing a structured framework to ensure thorough exploration of pertinent subjects. These conversations were verbatim recorded on audio and written out in a Word document. Themes were developed through thematic analysis by the institution's qualitative experts, and these themes eventually evolved into the SQ items, which included the three core domains of satisfaction, attitude, and perception. Additional inquiries yielded demographic and other pertinent data.

2.4. Content validity

A 15-member independent panel of experts comprising one professor in medicine, one associate professor in respiratory care, three assistant professors in respiratory care, five lecturers and five respiratory therapists with more than five years of experience discussed, evaluated, and modified these potential items using the Lawshe method. This approach has been widely utilized to establish and quantify content validity across various fields such as healthcare, education, and organizational development. It involves a panel of subject matter "experts" evaluating the items and categorizing them into one of three groups: 'Essential', 'Useful but not essential', or 'Not necessary'. Items rated as 'Essential' are retained in the final instrument, while those in the other categories are excluded. According to Lawshe, relying on "established psychophysical principles", achieving a 50 % agreement rate provides a degree of confidence in content validity [16]. Inclusion in the SQ is contingent upon the consensus of at least eight out of the 15 experts. Inputs and recommendations from the expert panel contributed to significant refinements and aided in the development of a more extensive SQ. The resultant SQ comprised 49 closed-ended questions, utilizing a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). It's important to note that demographic inquiries and open-ended questions regarding facilitators, hindering factors, and suggestions were excluded from the questionnaire [17].

2.5. Data collection

The responses were collected between June 2021 and January 2022. Participants received questionnaires along with an explanatory statement and a consent form appended. They were requested to sign the consent form as confirmation of their voluntary participation in the study, indicating their understanding of the study's objectives. Assurances were provided regarding the anonymity of their responses, and it was emphasized that the study findings would solely be utilized for research purposes. Data pertaining to the samples were disseminated among all authors of the current study under data use agreements.

2.6. Data analysis

Identical, unbearable and undesirable data were revised before the main scrutiny. A histogram was utilized to assess normality, while a box plot was employed to identify outliers for factor analysis. No outliers were detected, and the distribution remained largely normal. Initially, the calibration sample underwent EFA, with Principal Component Analysis (PCA) applied to investigate the factor structure within each of the three components [18]. Subject matter experts then delineated the distinct factors and underlying components. The evaluation of global goodness-of-fit model indices was conducted using R statistical software version 4.0.2.

In this study, the model was assessed by Chi-square Goodness-of-fit Index (GFI, P > 00.05), Comparative Fit Index (CFI, >90), Root

Mean Square Error of Approximation (RMSEA, <0.05), Approximate Goodness of Fit Indices (AGFI), Normed Fit Index (NFI, 0–1), and Standardized Root Mean Square Residuals (SRMR,0.08) [19–21]. The GFI amalgamates the degree of variance and covariance to depict the adequacy of how the model aligns with the observed data sets [22,23].

SPSS Version 25 for EFA and CFA was performed using the Lavaan package of R version 3.1.2 [24]. Prior to factor analysis, the Kaiser-Meyer-Olkin (KMO) test (>0.60) and Bartlett's test of sphericity ($p < 0.05$) were performed to evaluate the suitability of the data for conducting a factor analysis [25]. Items with a factor loading equal to or greater than 0.50 ($\geq$0.50) were chosen for inclusion [26].

Cronbach's alpha was employed to assess the internal consistency and reliability of the SQ and its subscales. Additionally, Composite Reliability (CR) served as a measure of internal consistency for the factors, with values exceeding 0.70 indicating satisfactory reliability [27]. Convergent and discriminant validity were evaluated using the methodology recommended by Fornell and Larcker [28]. In this method, we obtained discriminant validity with the cut-off value of >0.70 and the Average Variance Extracted (AVE), >0.50 indicated good convergence [29]. Discriminant validity was assessed by comparing the square root of the Average Variance Extracted (AVE) of each factor with the correlations between factors within the instrument. Subsequently, data from the entire sample

Table 2
Descriptive statistics.

Descriptive Statistics							
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
P1	388	3	5	4.68	0.473	−0.837	−1.104
P2	388	1	5	4.31	0.875	−1.429	2.194
P3	388	2	5	4.88	0.374	−3.443	14.284
P4	388	2	5	4.76	0.515	−2.542	8.006
P5	388	1	5	4.52	0.649	−1.409	2.779
P6	388	1	5	3.55	01.12	−0.529	−0.391
P7	388	1	5	4.04	0.914	−0.918	0.831
P8	388	1	5	2.80	01.21	0.154	−0.744
P10	388	1	5	3.79	1.118	−0.713	−0.361
P11	388	1	5	3.90	0.987	−0.672	0.012
P12	388	1	5	3.54	01.04	−0.499	−0.341
P13	388	1	5	2.99	1.107	−0.070	−0.873
P14	388	1	5	3.52	1.025	−0.382	−0.535
P15	388	1	5	4.34	0.836	−1.448	2.452
P16	388	1	5	4.22	0.861	−1.103	1.067
P17	388	1	5	3.30	1.096	−0.147	−0.595
P18	388	1	5	3.79	1.125	−0.792	−0.112
P19	388	1	5	4.53	0.870	−2.181	4.710
P20	388	1	5	4.01	0.919	−0.788	0.341
P21	388	1	5	2.96	1.099	0.152	−0.655
P22	388	1	5	3.35	1.015	−0.200	−0.579
P23	388	1	5	3.26	1.203	−0.206	−0.899
P24	388	1	5	3.30	1.070	−0.085	−0.582
P25	388	1	5	3.45	1.024	−0.281	−0.392
P26	388	1	5	3.48	1.000	−0.287	−0.329
A1	388	2	5	4.65	0.611	−1.805	3.264
A2	388	1	5	1.90	0.877	1.033	1.059
A3	388	1	5	2.55	1.083	0.462	−0.320
A4	388	1	5	4.23	0.864	−1.239	1.704
A5	388	1	5	4.05	0.975	−1.090	0.934
A6	388	1	5	3.96	0.985	−0.824	0.203
S1	388	1	5	2.27	1.195	0.497	−0.652
S2	388	1	5	3.08	1.247	−0.093	−1.012
S3	388	1	5	3.64	0.980	−0.568	0.008
S4	388	1	5	3.69	1.018	−0.718	0.065
S5	388	1	5	2.65	1.157	0.396	−0.675
S6	388	1	5	3.02	1.126	0.052	−0.878
S7	388	1	5	4.23	0.815	−1.198	2.075
S8	388	1	5	2.88	1.077	0.205	−0.509
S9	388	1	5	3.81	0.955	−0.724	0.342
S10	388	1	5	2.97	1.066	−0.026	−0.623
S11	388	1	5	3.31	1.220	−0.388	−0.749
S12	388	1	3	1.55	0.872	1.006	−0.924
S13	388	0	5	4.00	1.289	−1.458	1.808
S14	388	0	5	2.64	1.556	−0.361	−0.854
S15	388	0	5	3.07	1.598	−0.707	−0.527
S16	388	0	5	3.00	1.563	−0.685	−0.542
S17	388	0	5	2.80	1.511	−0.550	−0.543
S18	388	0	5	2.68	1.469	−0.483	−0.627
Total				3.50	0.259		

comprising three factors were utilized for Structural Equation Modeling (SEM) to predict overall satisfaction and examine measurement invariance. The statistical analyses were conducted using the R statistical software program and the Lavaan Package [24].

2.7. Ethical consideration

Prior to participant recruitment, ethical approval was obtained from the hosting institution (Reference: SUEC 2020/001, dated January 2nd, 2020). Participants were informed that the purpose of the survey was to assess their perception, attitude and satisfaction with their work profile as frontline healthcare providers. Participation in this study was voluntary; informed consent was obtained from all the respondents.

3. Results

3.1. Participants characteristics

The analysis included a total of 388 respiratory therapists, following the exclusion of 12 responses deemed invalid or from participants unwilling to partake in the survey. Of these, 106 (27.3 %) were from Karnataka state, 342 (88 %) are 21–30 years old and 238 (61 %) were female (Table 1).

3.2. Descriptive statistics of the items

Forty-nine (49) items were measured by the mean, standard deviation, skewness, and kurtosis (Table 2). The total mean was 3.50 (S.D = 0.259), and the range was from 1.55 to 4.88, with a standard deviation from 0.374 to 1.59. The skewness (<0.2) and ranged

Table 3
Factor loadings and communalities.

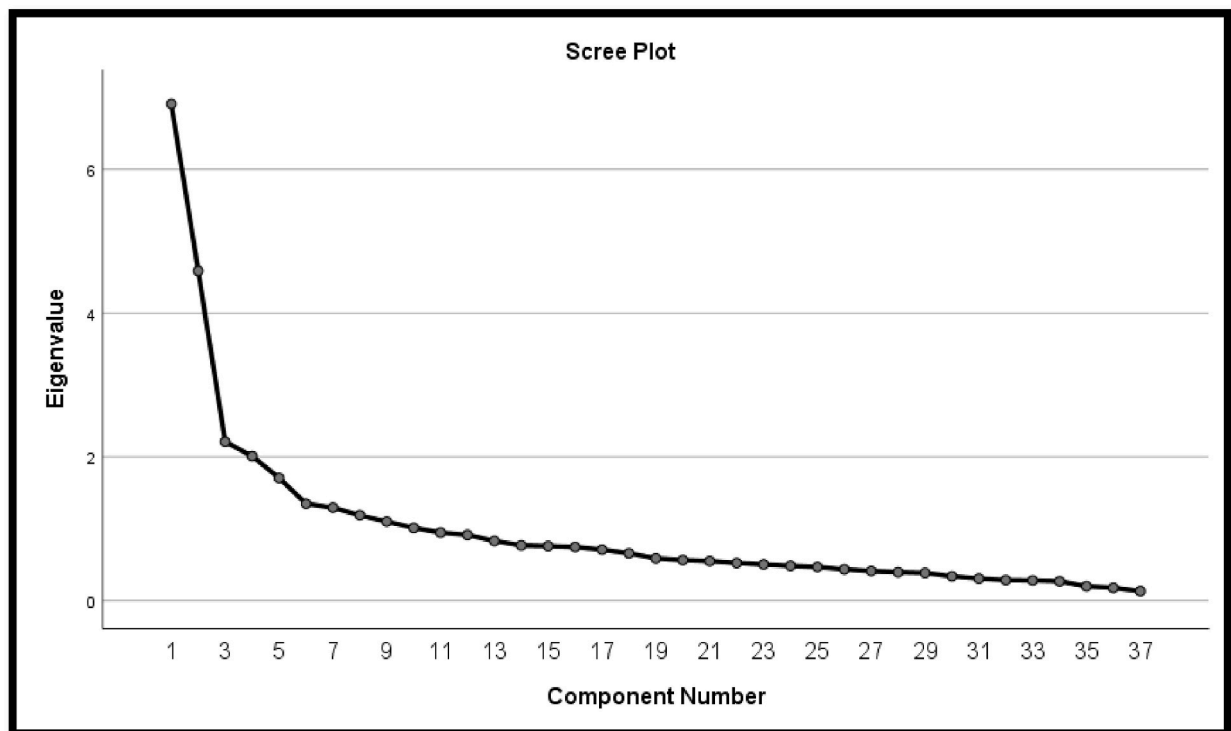| Factor	Items	Questionnaires	Estimation	communalities
Perception	.P1	RT is a humanitarian, caring profession, where ethical standards of care are maintained	0.211	0.228
	.P6	RT receives recognition from the community	0.64	0.446
	.P7	RT are decision makers in Respiratory patient care	0.471	0.368
	.P8	RT as a profession does not require eligibility criteria (For joining the course)	1.351	0.263
	.P10	RT profession is equal to other healthcare disciplines	1.134	0.119
	.P11	I think Respiratory Therapy would be a great profession for my children	0.615	0.436
	.P12	Demanding work schedule	1.048	0.177
	.P13	Not enough new graduates to fill increasing number of jobs]	1.184	0.198
	.P14	Work is physically and emotionally challenging	1.019	0.225
	.P15	In India, RTs are not recognized enough for their contributions	0.653	0.442
	.P18	Lack of knowledge about this profession	1.224	0.245
	.P20	Increased stress on Respiratory Therapists	0.843	0.328
	.P21	Higher pay for Respiratory Therapists	1.031	0.189
	.P22	More job choices for presently working Respiratory Therapists	0.825	0.249
	.P23	Shortage of RTs will reduce quality care for patients	1.438	0.198
	.P24	Respiratory Therapists will be leaving for other jobs	1.069	0.323
	.P25	More respect for Respiratory Therapists	0.76	0.369
	.P26	Improvement in workplace environment	0.849	0.255
Satisfaction	.S1	I am Frustrated	1.419	0.417
	.S2	Happy (I am happy with my career choice)	0.997	0.507
	.S3	Satisfied (My career as an RT is rewarding)	0.905	0.655
	.S4	I would recommend RT as a career choice to me immediate family of close friend	0.668	0.541
	.S5	I feel Respiratory Therapy is similar to the servants job	1.161	0.324
	.S6	I feel I am being paid a fair amount for the work I do	1.178	0.289
	.S8	There is really too little chance for promotion on my job	1.109	0.186
	.S9	When I do a good job, I receive the recognition/appreciation for it that I should receive	0.73	0.321
	.S10	I sometimes feel my job is meaningless	1.109	0.389
	.S11	I do not feel that the work I do is appreciated	0.7	0.248
	.S15	There is too much bickering and fighting at work	1.699	0.27
	.S16	There are tremendous opportunities for personal growth	1.774	0.277
	.S17	Work assignments are not fully explained	1.843	0.218
	.S18	I am satisfied with the career ladder and financial benefits of a Respiratory Therapist	1.953	0.118
Attitude	.A3	Low salary and allowances	0.888	0.513
	.A4	Rewards and incentives	0.354	0.53
	.A5	Public perceptions of the RT profession	0.212	0.554
	.A6	Relationship with other disciplines	0.374	0.566
Kaiser-Meyer-Olkin Measure of Sampling Adequacy			0.836	
Bartlett's Test of Sphericity	Approximate X^2		5676.37	
	Degree of freedom (*df*)		666	
	Significance		0.0001	

Figure: 1. The Scree plot obtained from exploratory factor analysis for the questionnaire showing eigenvalues for each component.

from −3.443 to 1.033, and the kurtosis (<0.07) ranged from −1.104 to 14.284.

3.3. Exploratory Factor Analysis

EFA was performed using the PCA rotation method in accordance with Kaiser Normalization on the data obtained from the 388 participants. The Kaiser-Meyer-Oklin measure offers a method for contrasting partial correlations between pairs of variables with zero-order correlations [30]. Kaiser (1974) claimed that if the KMO is > 0.50, it is acceptable; the KMO in the study model was 0.90. The correlations between the pairs of variables that can be explained by the other variables are better when the KMO is close to 1 (Table 3) [31].

In this study, the KMO measure was calculated to be 0.836, indicating that the sample size was sufficient for conducting factor analysis. Additionally, the Bartlett's Test of Sphericity yielded a significant result, signifying a strong relationship among the variables and confirming the appropriateness of the data for conducting an EFA [32]. The outcomes of the Exploratory Factor Analysis (EFA) models, as depicted in Table 3, corroborated the anticipated number of factors. The perception factor contained 25 items (P1–P26), the satisfaction factor contained 18 items (S1–S18), and the attitudes factor contained 6 items (A1-A6); all items loaded onto the anticipated factor.

In the perception domain, the results of the EFA revealed that eight items (8 items) exhibited inadequate loading (factor loading less than 0.30) on the respective factor: P2 to P5, P9, P16, P17, and P19. For the attitude factor, A1 and A2 items and satisfaction factor, S7, S12, S13, and S14 were not loaded well. Therefore, they were sequentially trimmed from the model. The modified model on perception comprised of P1, P6–P8, P10-15, P18, and P20-26, satisfaction comprised S1–S7, S8–S11 and S15–S18, attitude factor contains A3–A6, and accounted for 61.2 % of the total variance. The eigenvalues are plotted against the factors in Cattel's (1966) scree plot (Fig. 1). Factor selections are usually guided by the last break or change of slope in the plot. In this plot, there is a large break between the first, second, and the third factors. So, factor 2 was eliminated. Cronbach alpha values for the three items domains ranged from 0.89 to 0.94. The total Cronbach alpha measure was 0.94, which is considered satisfactory.

In the exploratory factor analysis (EFA), the rotation factor matrix was employed to provide insights into whether the factors belong to the same or different factors. The rotated component matrix is indispensable for achieving a simplified structure, emphasizing high factor loadings on one factor and low loadings on other factors. This aligns with the core principle of exploratory factor analysis, ensuring that items correlate with all factors, while good items exhibit high factor loadings on the specific factors they measure. The results, as depicted in the Rotated Factor Matrix from Table 4, reveal correlation values ranging from −1 to +1, indicating correlations between variables and factors. Negative values signify negative correlations, while positive values denote positive correlations.

Table 4
Rotated factor matrix.

Rotated Component Matrix

	Component												
	1	2	3	4	5	6	7	8	9	10	11	12	13
RT is a humanitarian, caring profession, where ethical standards of care are maintained	0.058	−0.027	0.014	0.673	0.069	−0.037	0.217	0.02	−0.033	−0.1	−0.006	0.049	−0.088
RT is an indispensable profession	0.003	−0.14	0.042	0.543	0.049	−0.091	−0.054	0.083	0.06	0.106	−0.175	−0.109	−0.464
Respiratory Therapists plays an important role in patient care	0.267	−0.061	0.015	0.608	0.035	0.196	−0.056	−0.095	0.024	0.066	0.009	0.151	−0.1
RT is an integral part of a multidisciplinary team who effectively contributes to the health care industry	0.225	−0.037	−0.012	0.684	0.177	0.011	−0.048	−0.011	−0.009	0.141	−0.046	−0.016	0.034
RT as a profession, supporting self-realization	0.234	−0.074	0.046	0.697	0.023	−0.068	0.101	0.124	0.14	−0.01	−0.157	−0.094	0.186
RT receives recognition from the community	0.29	−0.062	−0.154	0.287	−0.24	0.208	0.307	0.459	−0.008	0.033	0.089	−0.012	0.162
RT are decision makers in Respiratory patient care	0.273	−0.044	−0.206	0.352	−0.196	0.289	0.266	0.308	−0.087	0.151	0.185	−0.041	0.131
RT as a profession does not require eligibility criteria (For joining the course)	0.013	0.12	0.165	−0.002	0.021	0.076	0.146	0.732	0.161	−0.174	0.04	−0.052	−0.16
RT profession is equal to other healthcare disciplines	0.193	0.041	−0.101	0.12	−0.08	−0.052	0.026	0.602	−0.044	0.242	0.009	0.133	0.188
I think Respiratory Therapy would be a great profession for my children	0.67	−0.07	−0.046	0.136	−0.099	0.121	0.116	0.229	−0.026	0.061	−0.017	0.006	0.071
I feel Respiratory Therapy is similar to the servants job	−0.072	0.163	0.347	−0.095	0.043	0.037	0.037	0.714	0.102	−0.073	0.02	0.027	−0.018
I feel I am being paid a fair amount for the work I do	0.191	−0.142	−0.045	0.011	−0.145	0.117	0.662	0.095	−0.051	0.127	−0.05	−0.075	0.051
There is really too little chance for promotion on my job	−0.065	0.109	0.284	0.033	0.145	−0.036	−0.022	0.087	0.046	0.097	−0.056	0.728	−0.056
When I do a good job, I receive the recognition/appreciation for it that I should receive	0.162	−0.103	−0.185	0.12	−0.105	0.134	0.645	0.126	0.107	−0.092	−0.035	0.117	0.003
I sometimes feel my job is meaningless	−0.13	0.242	0.605	−0.117	0.033	−0.015	−0.122	0.149	0.009	0.147	0.268	0.106	−0.017
I do not feel that the work I do is appreciated	0.047	0.156	0.547	−0.111	−0.017	−0.053	−0.143	0.135	0.02	0.122	0.413	0.113	0.135
I like doing the things I do at work	0.467	−0.139	0.014	0.075	0.177	−0.163	0.256	0.006	0.242	−0.177	0.244	0.087	0.064
There is too much bickering and fighting at work	−0.068	0.167	0.729	0.122	0.007	0.09	−0.033	0.01	0.029	−0.037	−0.005	0.129	−0.042
There are tremendous opportunities for personal growth	0.328	−0.09	0.148	0.162	−0.016	0.01	0.265	0.171	0.286	0.074	−0.226	−0.299	0.049
Work assignments are not fully explained	−0.033	0.159	0.665	0.06	0.005	0.014	0.022	0.068	0.03	−0.018	−0.025	0.001	−0.005
I am satisfied with the career ladder and financial benefits of a Respiratory Therapist	0.428	−0.139	0.059	0.068	−0.186	0.102	0.625	0.034	0.006	−0.017	0.049	−0.132	−0.007
I am proud to be a Respiratory Therapist	0.688	−0.056	−0.155	0.274	0.031	0.183	−0.041	−0.052	0.014	−0.059	−0.055	0.037	−0.104
I feel shy	−0.187	0.153	0.418	−0.105	0.051	0.059	0.104	0.147	0.031	0.09	−0.126	−0.265	0.553
I am Frustrated	−0.42	0.206	0.523	−0.038	0.058	0.035	−0.107	−0.056	0.091	0.051	0.153	−0.003	0.169
Happy (I am happy with my career choice)	0.731	−0.17	−0.053	0.12	−0.06	0.081	0.162	0	0.01	−0.079	−0.175	0.028	−0.085
Satisfied (My career as an RT is rewarding)	0.658	−0.107	−0.174	0.218	−0.072	0.134	0.412	0.041	0.063	−0.063	−0.039	−0.068	−0.023
I would recommend RT as a career choice to me immediate family of close friend	0.739	−0.157	−0.015	0.119	−0.068	0.172	0.145	0	0.098	−0.033	−0.14	−0.12	0.026
Do you have any intention to leave Respiratory Therapy profession?	−0.411	0.202	0.196	−0.092	0.111	−0.066	0.085	−0.038	0.03	−0.018	0.583	0.039	−0.101
No, I am not planning to leave the profession	0.264	0.204	−0.173	0.184	−0.039	0.009	0.065	−0.127	0.002	0.058	−0.58	0.139	−0.061
Work environment	−0.153	0.797	0.179	−0.097	0.004	0.068	0.063	0.013	0.095	0.057	0.091	−0.08	−0.118

(*continued on next page*)

Table 4 (*continued*)

Rotated Component Matrix

	Component												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Low salary and allowances	−0.125	0.823	0.105	0.023	0.07	−0.019	−0.266	0.025	0.075	0.034	0.006	0.126	0.058
Rewards and incentives	−0.121	0.85	0.118	−0.053	0.105	0.008	−0.162	0.054	0.054	−0.012	0.009	0.049	0.078
Public perceptions of the RT profession	−0.066	0.856	0.163	−0.086	0.05	0.015	−0.054	0.106	0.062	−0.002	−0.027	0.04	0.07
Relationship with other disciplines	−0.125	0.837	0.203	−0.045	0.021	0.04	0.013	0.059	0.058	0.003	−0.044	0.016	0.024
Demanding work schedule]	0.067	0.125	−0.018	0.025	−0.03	0.114	−0.029	0.072	0.746	0.047	0.005	−0.017	−0.161
Not enough new graduates to fill increasing number of jobs]	−0.071	0.094	0.131	0.006	−0.037	0.076	0.243	0.061	0.621	0.067	−0.222	0.131	0.159
Work is physically and emotionally challenging	0.08	0.115	0.061	−0.005	0.174	0.22	−0.049	0.045	0.677	−0.021	0.185	−0.095	0.127
In India, RTs are not recognized enough for their contributions	−0.097	0.033	0.021	0.077	0.752	−0.022	−0.105	−0.014	0.059	0.08	−0.019	0.004	−0.09
Wages/remunerations are not high enough	0.018	0.159	−0.011	0.127	0.742	−0.048	−0.117	−0.044	0.058	0.086	0.156	0.026	0.1
Other careers are more attractive]	−0.35	0.04	0.193	−0.092	0.507	0.062	0.294	0.15	0.071	0.136	0.111	0.194	0.078
Lack of knowledge about this profession	0.009	0.021	0.173	−0.063	0.582	0.016	−0.012	0.095	−0.062	0.185	−0.165	−0.012	−0.346
There is no recognition for this profession at Government Level.]	−0.025	0.005	−0.119	0.151	0.652	−0.059	−0.185	−0.131	0.025	0.091	0.039	0.061	0.117
Increased stress on Respiratory Therapists	0.077	0.045	−0.034	0.139	0.194	−0.032	−0.127	−0.01	0.492	0.466	0.071	0.204	−0.131
Higher pay for Respiratory Therapists	0.102	−0.012	0.03	−0.083	0.08	0.75	0.137	0.066	−0.028	−0.014	−0.013	−0.141	−0.078
More job choices for presently working Respiratory Therapists	0.144	0.056	0.03	0.091	−0.056	0.704	0.125	−0.039	0.15	0.19	0.078	−0.118	−0.138
Lower quality care for patients	−0.051	0.014	0.05	0.045	0.219	0.041	0.109	−0.081	0.038	0.77	−0.066	−0.074	−0.049
Respiratory Therapists will be leaving for other jobs	−0.26	0.055	0.112	0.052	0.273	−0.114	−0.073	0.108	0.107	0.568	0.031	0.193	0.135
More respect for Respiratory Therapists	0.199	0.045	0.042	0.021	−0.125	0.76	0.031	0.051	0.164	−0.08	−0.071	0.102	0.176
Improvement in workplace environment	0.056	0.066	0.037	0.052	−0.045	0.62	0.039	0.053	0.234	−0.251	−0.126	0.327	0.202

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 20 iterations.

3.4. Confirmatory Factor Analysis

Cross-validation of the identified three factors of the usefulness of technology CFA confirmed a positive correlation between the factors. Pearson's correlation coefficients were computed to investigate the inter-relationships between the factors, as illustrated in Table 5. The measurement model fit using CFA is shown in Fig. 2. The model fit the data adequately with a good GFI (0.94), TLI (0.90) and RMSEA (0.05). The raw $\chi 2$ is 2625, and $\chi 2/df$ (Degree of freedom) is 4.4 with p-value <0.01 (Table 6). The goodness of fit indices (GFI, TLI, and CFI) were greater than 0.90. The findings fell within acceptable ranges, affirming the validation of the three factors derived from the EFA.

The Average Variance Extracted (AVE) of the constructs in the study was computed and juxtaposed with the inter-factor correlations [33]. Preliminary evidence of convergent validity was established when the Average Variance Extracted (AVE) of each construct surpassed its correlation with other constructs. The Maximum Shared Variance (MSV) was used to compare the discriminant validity of the competency scale to the AVE and found to be lower for all of the scale's constructs [29,34]. Table 7 presents the outcomes concerning Convergent and Discriminant Validities.

4. Discussion

This paper is the first to report the development and preliminary validation of the brief SQ for assessing career perceptions, attitude, and job satisfaction of respiratory therapists. In this study, EFA indicated that the three factors influenced the way respiratory therapists perceived their career progression (Factor 1), attitude (Factor 2), and job satisfaction (Factor 3). Through CFA, the model was tested and validated using several indices for Goodness fit: CFI; GFI; TLI; RMSEA, and SRMR as recommended by Kline (2005) [35]. According to Schreiber et al. (2006), it is important to use various model fit indices, and that if it specifies a good fit, there is a credible good fit [36]. Across the studies, the factor structure, and reliability (The Cronbach alpha values for the three items domains ranged from 0.89 to 0.94), were examined. The psychometric evaluations conducted on the SQ provided evidence supporting its stability, validity, and satisfactory internal consistency. These findings indicate that the SQ is both theoretically and empirically valid.

Our results indicated an uncertain level of overall job satisfaction among Indian respiratory therapists. Furthermore, our study revealed a lack of statistically significant association between overall job satisfaction and personal factors. This finding mirrors the results of a study conducted in the United States by Metcalf et al., as well as other investigations examining job satisfaction among various healthcare professionals [9,37,38].

Regarding occupational factors, this research revealed a significant association between job satisfaction and remuneration; respiratory therapists were not satisfied with their pay. Also, a majority were leaving the profession because of this and lack of proper recognition [39]. Respondents expressed the belief that enhancing respiratory therapists' salaries would enhance their job satisfaction. This finding is similar to Kaddourah's study (2013), which revealed that a majority of dissatisfied nurses were discontented with their wages [40].

The question "Shortage of respiratory therapists will reduce the quality of care for the patients" loaded the highest (P23-1.438) in the perception domain. However, it is striking that other items that loaded the most emphasized the lack of a regulatory mechanism that controls and monitor the entry-level criteria for joining the respiratory therapist training and professional practice, the associated question (P8-about RT as a profession does not require eligibility criteria (For joining the course)) loaded the second highest loaded factor (P8-1.351) in this domain, subsequently, the lack of public knowledge and awareness about the RT profession (P18-1.224).

These three items gain increasing significance while considering the commonality from the respondents, who were from over 388 RT practitioners across the country, and inadequate recognition of the RTs has been well documented until the recent Covid-19 outbreak [39,41,42]. While considering the satisfaction domain, the item that loaded the highest factor is the question related to respiratory therapists' satisfaction with the career ladder and financial benefits of a respiratory therapist (S18-1.953). This result is contradictory to the participant's response to the perception-related question - apparently, the reason for RTs leaving the job is poor wages (P21-1.031). In the attitude domain, the reason for RTs planning to leave the profession is low salary (A3-0.888).

In the validation process, this discrepancy does not have any significance statistically, however we presume that it might be the lack of understanding without a general agreement on what this aspect contributes to satisfaction and what its diverse aspects are. Misunderstandings may easily occur, perhaps that lead to unreliable and invalid survey results. Investigators must keep this in mind when they analyze the results of all prospective research studies.

4.1. Implications for respiratory therapy

The validated shorter version of the SQ seems to have implications that could be applied on a global scale, with the most significant one being the use of the SQ as a valid and appropriate instrument to appraise respiratory therapists' career perceptions, work attitudes,

Table: 5
Correlation matrixes between the factors.

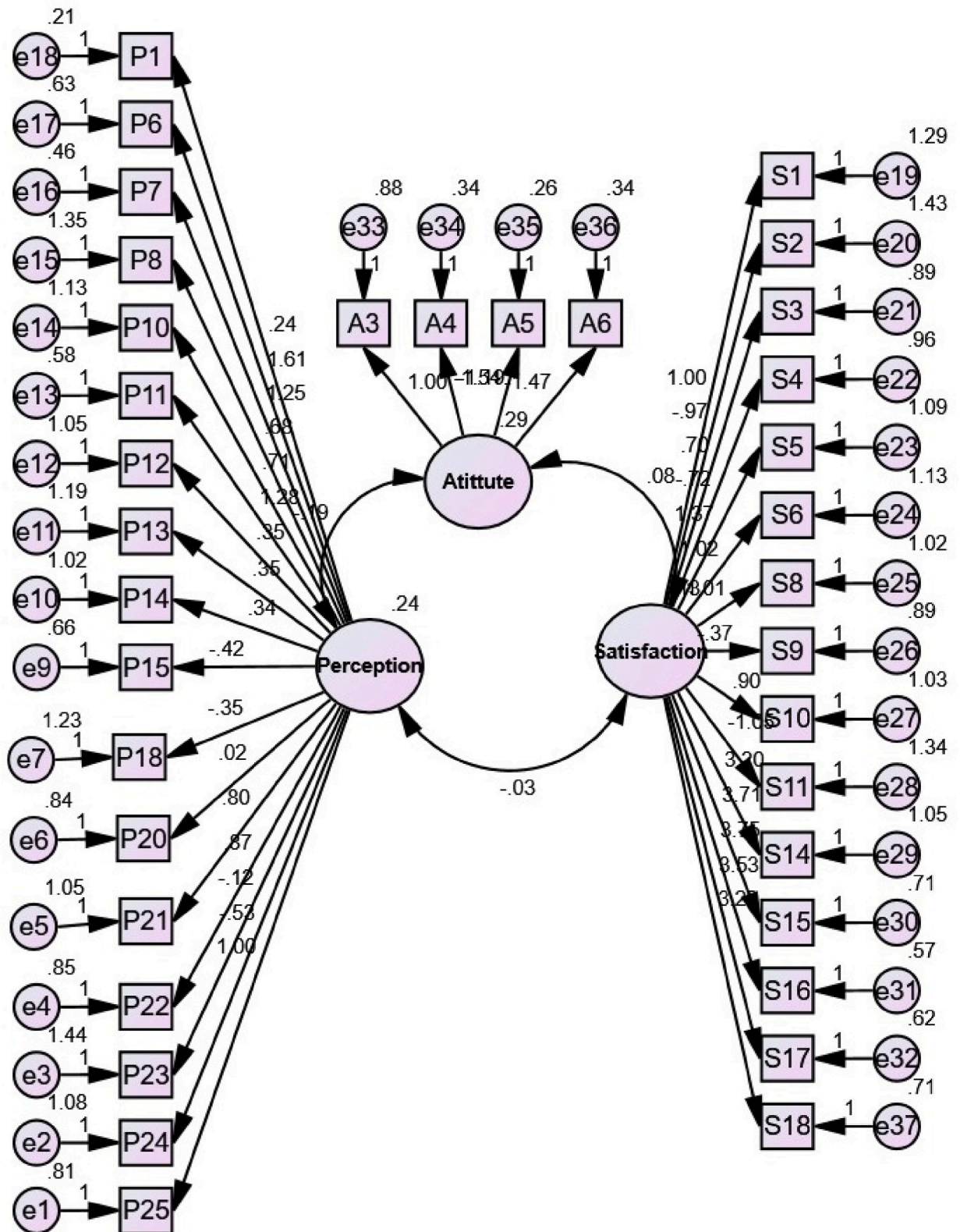|	Perception	Satisfaction	Attitude
Perception	1	–	–
Satisfaction	−0.713	1	–
Attitude	−0.715	0.79	1

Figure: 2. Structural Equation Modeling (SEM) results of the confirmatory factor analysis for the three-factor model (Standardized estimates).

Table: 6

Confirmatory Factor Analysis Process for scale.

χ2	RMSEA	TLI	CFI	GFI	χ 2/df	P value
2625	0.05	0.90	0.98	0.94	4.4	0.02

Table: 7

Validity and reliability measures.

	AVE	CR	MSV
Perception	0.84	0.73	0.29
Satisfaction	0.81	0.70	0.21
Attitude	0.91	0.78	0.22

and job satisfaction. Clinical respiratory therapy managers may find the SQ useful in evaluating and enhancing staff views, appraisals, and attitudes towards professional incentives. The outcomes of the SQ can help guide the selection of topics for enhancing respiratory therapists' professional perceptions in order to strengthen the degree of assessment and influencing elements of job satisfaction as well as tracking the changes in practice.

The capacity of medical institutions to avail these benefits is crucial for maintaining active engagement in the role of RTs. It is evident that there is a pressing need to enhance retention rates among RTs, especially in light of the global shortage of both current and future staffing in respiratory therapy. Additionally, the questionnaire could serve as an assessment tool to guide the design of career development initiatives and to evaluate the efficacy of training programs in influencing changes in attitudes, perceptions, and practices.

4.2. Strengths and limitations

To the best of our knowledge, this is the first standardized questionnaire tool to evaluate the perception, satisfaction, and attitude of respiratory therapists. The study's major strength is the response rate of this survey. Respiratory therapists working across the country participated in this study and represent a suitable sample of working respiratory therapists from diverse multicultural and social backgrounds.

Because there were not enough of studies using EFA, CFA, and SEM to validate the SQ among RTs, one of the study's shortcomings was that we were unable to compare the outcomes of the current study with those of earlier research investigations. To verify the validity of our study's findings, they must be repeated in other different countries and cultural backgrounds. The current study's sampling technique could restrict the generalizability of the findings, and the data points to the necessity for further evaluations using a sizable random clinical sample.

5. Conclusions

It is crucial to underscore that the 49-item structured questionnaire (SQ) demonstrates reliable psychometric properties, characterized by acceptable model fits, strong construct validity, and robust internal consistency. Few studies have investigated the level of respiratory therapists' job satisfaction and associated components. The SQ offers a multidimensional assessment tool, enabling a comprehensive exploration and identification of strategies to foster appropriate professional evaluations of healthy attitudes among respiratory therapists. It will allow the policymakers, directors, educators, researchers, and young RT leaders to evaluate and forge reflections on the perception, attitude, and satisfaction among RT workforces.

Contribution of the paper

- The paper uses an exploratory and confirmatory factor analysis to understand the career perceptions, job satisfaction, and attitudes of Respiratory Therapists.
- The methodology employed in this study sets a precedent for future research endeavors in the development and validation of research instruments.
- The three-factor model would be a useful tool to assess the perceptions, satisfaction, and attitude of RTs in the workplace.

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Institutional review board statement

The study began after securing Ethical clearance from Srinivas University, Mukka, Mangalore, India (Ref: SUEC 2020/001 Dated

02.01.2020) before the participants were recruited. Participants provided informed consent electronically and anonymously. All study procedures were performed in accordance with the relevant institutional guidelines and regulations. This study complied with the tenets of the Declaration of Helsinki.

Informed consent statement

Informed consent was obtained from all subjects involved in the study.

Data availability statement

The datasets generated for this study are available on request to the corresponding author.

CRediT authorship contribution statement

Jithin K Sreedharan: Writing – original draft, Validation, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Manjush Karthika:** Writing – review & editing, Methodology, Data curation. **Abdullah Alqahtani:** Writing – review & editing, Formal analysis, Data curation. **Ibrahim Albalawi:** Writing – review & editing, Visualization. **Meshal Alenazi:** Writing – review & editing, Validation, Methodology. **Ahmad Hezaim Alanazi:** Writing – review & editing, Data curation. **Ghosnan Mohammed Almkayeel:** Writing – review & editing, Data curation. **Mohammed Alahmari:** Writing – review & editing, Validation, Methodology, Data curation, Conceptualization. **Lynn Daley:** Writing – review & editing, Methodology, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Abbreviations

AGFI   Approximate Goodness of Fit Indices
AVE   Average Variance Extracted
CFA   Confirmatory factor analysis
CFI   Comparative Fit Index
CR   Composite Reliability
EFA   Exploratory factor analysis
GFI   Goodness-of-fit Index
NFI   Normed Fit Index
PCA   Principal Component Analysis
RMSEA   Root Mean Square Error of Approximation
RT   Respiratory Therapist
SME   Structural Equation Modeling
SRMR   Standardized Root Mean Square Residuals

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