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Research article

POSITIVE BELIEFS ABOUT ACCEPTING YOGA NIDRA: IMPLICATIONS ON ACADEMIC PERFORMANCE AMONG ADOLESCENTS'

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Abstract

During the last 53 years, behavioral and social researchers have investigated the positive effects of yoga nidra at the individual level. The qualitative and quantitative aspects of yoga nidra to assist the adolescents in its practice for better academic performance were covered. In study 1, we used inductive research to qualitatively understand why the adolescents accept or decline yoga nidra. In study 2, we developed a second order reflective of positive effects of yoga nidra. In study 3, we refined the scale using Exploratory and Confirmatory factor analysis and demonstrated its reliability, convergent, discriminate and criterion related validity. Finally, in study 4, we investigated the consequences of positive effects of yoga nidra in better academic performance. We find that those who practice yoga nidra are more likely to benefit and have better academic performance, also beneficial to the entire education system. Implications and future research directions are also discussed.

Key words: *Yoga nidra, academics, Adolescents, Scale development*

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INTRODUCTION

Yoga nidra, in general, is understood as a form of sleep meditation in supine posture (Saraswati, S. S., & Hiti, J. K., 1984). The literal translation of the word gets roughly translated as half sleep or conscious sleep. Yoga nidra in another sense it is a paradoxical state (Dinsmore, U., 2017) of mind-body, indicating the need to make it understandable for the common man. It may be resting the physical body in a supine position but at the same time it is fully awakened state and thus it is a resting sate with awareness. Swami Satyananda's book on yoga nidra (Saraswati, S. S., & Hiti, J. K., 1984) has brought the concept of yoga nidra into modern limelight and hence extensive research work on various dimensions of yoga nidra wellbeing.

Current research suggests that yoga nidra can help in relieving pain of the body and post –traumatic stress disorders. Miller, R., (2010) interprets yoga nidra as a meditative practice for deep relaxation and healing. Although the literal translation may be yogic sleep or sleep of the yogis - many would argue that yoga nidra can be better explained as a form of half-sleep or conscious sleep. Uma Dinsmore – Tuli perhaps best sums yoga nidra up as a paradox - where you rest the physical body but at the same time you are in a fully awakened state - thus resting in awareness.

What really brought yoga nidra into the modern limelight was the publication of Swami Satyananda's book on Yoga Nidra (in 1984). This work had a viral effect in opening up further frontiers in the field of yoga in both East- West. Yoga Nidra is not a conventional sleeping state but it is effortless relaxation state of body-mind system (Markil, N., et al., 2012). It may be described as the awareness state between wakefulness and sleep (Singh, G., & Singh, J., 2010). Recent studies (Vaishnav, B. S., et al., 2018; Li, L., et al, 2018; Ferreira-Vorkapic, C., et al., 2018) points out yoga nidra's relation to various dimensions of wellbeing like mindfulness, stress management, pain management, mental health. Psychological effects (Kim, S. D., 2017; Rani, K., et al, 2016; 2013; Parker, S., 2013; Eastman-Muller, H., et al, 2013) of yoga nidra in the case of women menstrual disorders, emotions, stress management (Anderson, R., et al., (2017), heart rate variability, Insomnia (Datta, K., et al., 2017), cognitive functions were studied in depth and reported to have improvement in the overall health status. Parker, S., (2013) as proposed an operational definition of yoga-nidra that is supported by several physiologically testable hypotheses regarding its outcomes and effects. In all these studies, much focus was on the benefits of yoga nidra in improving quality of sleep, eliminate the symptoms of insomnia, depression, anxiety, and post traumatic stress disorder and reducing the chronic pain (Livingston, E., 2018; Davis, S. C.,

2018), with a little or no mention of conceptual frame of reference indicating different variables in yoga nidra. It was also noted that how yoga nidra affects the academic performance of the students. In this study, we focused on development of conceptual frame of reference on yoga nidra (Fig.1) and its practicing techniques its advantages with analysis. An instrument is developed based on this yoga nidra frame.

Study 1; Qualitative frame of reference

In study 1, we used inductive research to qualitatively understand why the adolescents accept or decline yoga nidra. The qualitative understanding of yoga nidra is explained in the frame of theoretical frame of reference as shown in Figure 1. It is designed based on the experiments with yoga nidra by Saraswati, S. S., (2005). Using the art of relaxation, he experimented even with Alsatian dog apart from humans. The typical relaxation parameters for yoga nidra are shown in Figure 1. The frame is an indication of deepest sleep (may not be sleep at all). This awareness may be more potential than conscious states (Miller, R., 2010). That means, one can learn more in yoga nidra than awakened state. This is what we called it as rotation of awareness in eight steps shown in the Fig.1. These steps are; Toes to ankles, ankles to knees, knees to waist, waist to neck, neck to fingers, facial muscles including lips, nose and eyes, head (anterior and posterior), breath rate. The art of relaxing the body-mind system leads to the state – I am awake; I am practicing yoga nidra.

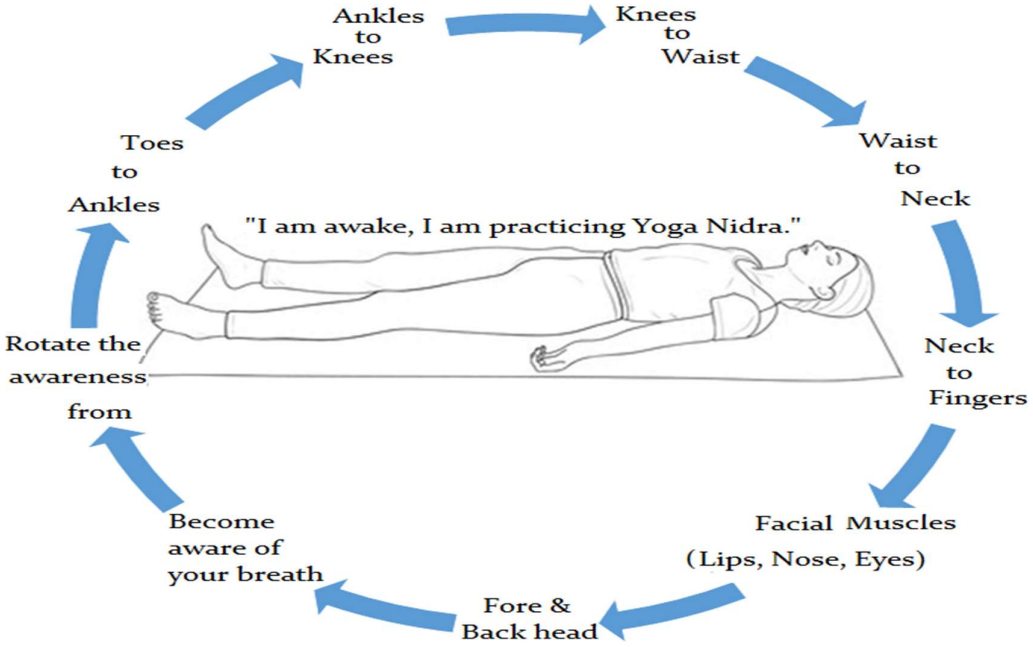

Fig.1 A reference frame showing Supine posture yoga nidra

Study 2; Qualitative measures

In study 2, we developed a methodology based on qualitative measures. The qualitative measures were based on secondary reflective practices of yoga nidra. All participants reported that the practice brought an experience of state of happiness, peace, and enhanced vitality during the session. Some of the qualitative experiences of yoga nidra of the adolescents were like; visualization processes of colored pictures, exam worries reduced, makes energetic, felt like in heaven, memory recall, clarity in thinking, confidence, felt blissful and happy, gratitude. Practicing yoga nidra brings happiness and helps in learning better. Students reported that they could focus in their studies. The learning became more enjoyable. A couple of them narrated that the practice allowed them to recall better while taking weekly examinations during study period. Some students reported that their self-confidence increased and described that their power of resolution.

Study 3; Psychometric analysis

In study 3, we refined our scale and demonstrate its convergent, discriminate and criterion related validity.

Participants

Hoelter, J. W., (1983) recommends a minimum sample size of 200 for a robust confirmatory factory analysis. DeVellis, R. F., (2016) recommends a ratio of 1:15 or 1:20 as an ideal sample size. Validation was conducted with a sample of 851 Indian individuals were selected based on convenient sampling. The individuals who practicing yoga nidra regularly for 10 to 15 minute were approached for participation in the study. Age of the individuals was considered as the criterion for inclusion and adolescents aged between 10-18 years were included in the study. The individuals who consented to provide data were included in the sample. The data were collected from 4 April to 5 May 2018.

Procedure

Following recommendations of DeVellis, R. F., (2016) and Pasquali, L., (2010) scale development for the present study was accomplished in three stages namely item generation, theoretical analysis and psychometric analysis.

We developed the initial item pool for yoga nidra or yoga sleep on the lines of methodology given by Montero, I., & Leon, O. G., (2007). We considered yoga nidra as the constructs for scale development. The present research employed combination of deductive and inductive methods of initial item pool generation as recommended by Kapuscinski, A. N., & Masters, K. S., (2010). As a result, 20 items were developed under the selected content domains using Likert scale (Likert, R., 1932).

The researchers, in order to assess content validity of the initial items, sought opinions from four experts in the field of education and yoga. The experts assessed the relevance of items in relation to the content domain applying a tool namely

Content Validity Index (CVI) developed by Waltz, C., et al., (2010). The experts rated each item against a four-point scale (1=Note relevant, 2= somewhat relevant, 3=Quite relevant and 4=highly relevant). A score of 3 or 4 indicates that the content represented by each item was considered valid and in harmony with the theory that is being measured and they are retained. The items which received score 1 or 2 were rejected from the scale. Visual appearance of the tool such as consistency of the style, formatting, readability and feasibility as prescribed by Devon, et al., (2007) were tested by applying the initial level scale with 40 individuals. The respondents were asked to judge the user-friendliness of the tool. Feedback from the respondents was incorporated to improve the tool. This process was helpful to assess ambiguity and skewedness i.e. respondents providing very similar answer to all the items.

The psychometric analysis involves a number of quantitative techniques to test construct validity and reliability of the scale. In addition to construct validity, convergent validity, criterion validity and discriminant validity of the scale were tested quantitatively. DeVellis, R. F., (2016) strongly recommends the combined use of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to achieve consistent results of the psychometric indices. Hence, these validity tests were done using EFA and CFA. Reliability, a quantification method producing the consistent results on recurring examinations was measured in terms of indicators namely Cronbach Alpha, Spearman-Brown coefficient and composite reliability. Concurrent validity was assessed by calculating the correlation between the scores of the present scale and an established scale namely Yoga Self Efficacy Scale (Birdee, G. S., et al., 2015).

Data collection and analysis

The scale was with five options ranging from 'strongly disagree' (score 1) to 'strongly agree' (score 5). Each of the items in the scale is an agreement statement on the five point Likert scale. All the items in the scale were positively stated about yoga nidra and academic performances. The summated score of all the items was treated as the quantifiable measure of the construct and it was considered for all quantitative analytical purposes. All items included in the Likert scale were considered as continuous variables. The scale was prepared in English and the locally spoken language Hindi to facilitate respondents' comprehension over the statements. The questionnaire was filled by the respondents.

Factors are extracted and a factor structure including the correlation between the factors is proposed by EFA. The proposed factor structure is hypothesized and tested in CFA. If the statistical results fits with the hypothesized model the researcher can conclude that the factor structure is valid

(Reise, S. P.,et al., 2000). Hence, the study evaluated the scale using both EFA and CFA. IBM SPSS 25 software version was used to calculate descriptive statistics, correlation matrix, EFA and Cronbach Alpha value. IBM SPSS Amos 25 software version was used to perform CFA. Convergent validity was verified using the Average Variance Extracted, a statistic calculated from values of factor loads. Construct validity was assessed by computing model fitness indices namely p value of Chi square, RMSEA, GFI, AGFI, CFI, TLI, NFI and Chisq/df which were the outputs of confirmatory factor analysis. Discriminant validity was examined by measuring the level of redundancy of items through Modification Indices.

Study 4; Findings

The findings of our study are given in subsequent Tables. We investigated the consequences of positive effects of yoga nidra for better academic performance.

TABLE - I
CHARACTERISTICS OF PARTICIPANTS

A sample size of 851 adolescents in the age group ranging 11 to 18 years were selected for the study to test the psychometric properties of the yoga nidra scale (YNS). The group covers both male 425 (49.94%) and female 426 (50.06%) populations. Among the total participants, 98.03% practiced yoga nidra for 10-15 minutes during the yoga classes lasting 40 minutes each class. The demographic details of the subjects are given in Table 1.

Characteristics	**Total** (N=851)		**Population**			
			Male (N =425)		**Female** (N =426)	
	N	%	N	%	N	%
11-12 years	210	24.68	106	50.48	104	49.52
13-15 years	215	25.26	104	48.37	111	51.63
16-17 Years	214	25.15	108	50.47	106	49.53
18-19 Years	212	24.91	107	50.47	105	49.53

From the initial pool of 20 items, 6 items on the Yoga Nidra Scale (YNS) were deemed to be invalid based on experts rating calculations and 14 –item were retained with content validity index value of 0.84. After modifying the scale based on rating by the experts, the scale was individually administered to 40 students who regularly practiced yoga nidra. The statements were modified based on the respondents' feedback and further two items were reduced resulting into a 12 items. The 12 items developed after content validity testing and cognitive interviews with select respondents, are presented in the Table - II.

TABLE – II
POSITIVE BELIEFS ABOUT YOGA NIDRA

Construct	Items
Positive beliefs about yoga nidra on academic performance	1. Yoga nidra may be an art of relaxation.
	2. I gained breath control by practicing yoga nidra.
	3. I experienced rotating awareness from toes to head.
	4. I believe, I am awake in yoga nidra.
	5. I experienced positive nature of mind.
	6. I believe I am happy in my daily routine.
	7. I feel gratitude always towards my teachers.
	8. Yoga nidra produces vitality in the body.
	9. Visualization has become a habit in my life.
	10. A better indicator of academic performance.
	11. I overcome distress and feel good.
	12. I may have enhanced memory.

The scale evolved after theoretical analysis with 12 items was administered to 851 participants. Exploratory factor analysis (EFA) was conducted using the scores obtained from the survey. The Kaiser– Meyer- Olkin (KMO) measure was used to assess the sample adequacy. KMO value was 0.96 and it was significant ($p<0.001$). Bartlett's Test of Sphericity value which tests association between the variables was significant ($p<0.001$). Principal Component Analysis method of factor extraction was used and one factor was extracted explaining 71.61% of the total variance. Results of the Scree plot technique indicated extraction of one factor from the 12 variables. Values of factor loading measures ranged from 0.75 and 0.85. Since all the factor load values of all the 12 variables were greater than 0.5, all of them were retained in the scale for next level confirmatory factor analysis.

The researchers conducted a CFA applying a structural equation modeling to test a hypothetically developed factor structure with one latent factor and 12 observed variables. The model obtained from confirmatory analysis is presented in Figure - 1.

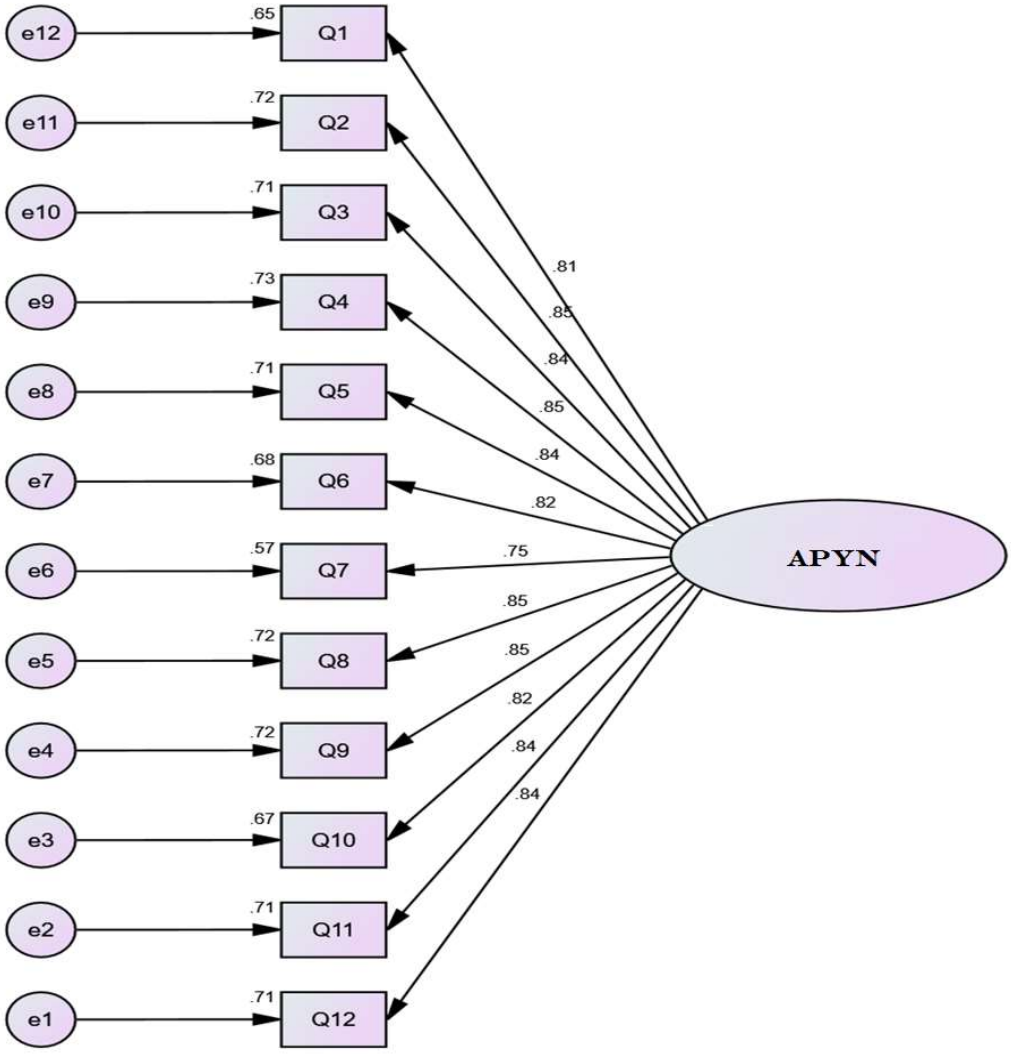

Fig. 1. CFA: Academic performance through yoga nidra

The factor loadings for the 12 items obtained from the confirmatory analysis are given in Table 3.

TABLE – III
FACTOR LOADINGS OF THE SCALE

Sl. No.	Item	Factor load
1.	Yoga nidra may be an art of relaxation.	0.83
2.	I gained breath control by practicing yoga nidra.	0.85
3.	I experienced rotating awareness from toes to head.	0.82
4.	I believe, I am awake in yoga nidra.	0.85
5.	I experienced positive nature of mind.	0.84
6.	I believe I am happy in my daily routine.	0.74
7.	I feel gratitude always towards my teachers.	0.80
8.	Yoga nidra produces vitality in the body.	0.85
9.	Visualization has become a habit in my life.	0.86
10.	A better indicator of academic performance.	0.83
11.	I overcome distress and feel good.	0.84
12.	I may have enhanced memory.	0.80

Construct validity: In confirmatory factor analysis many indices of model fitness are used to test construct validity. Hair, J. F., et al., (2010) recommends to use at least one index from model fit categories namely absolute fit, incremental fit and Parsimonious fit. Results obtained in the present study on model fitness indices are presented in Table 4.

TABLE - IV
THE FITNESS INDICES THROUGH CONFIRMATORY FACTOR ANALYSIS OF THE YNS

Name of category	Name of index	Accepted level	Study result
Incremental fit	Comparative Fit Index (CFI)	>0.90	0.99
	Tucker-Lewis Index (TLI)	>0.90	0.98

	Normed Fit Index (NFI)	>0.90	0.98
	Adjusted Goodness of Fit (AGFI)	>0.90	0.95
Parsimonious fit	Chi Square/Degrees of Freedom (Chi-square/df)	df<3.0	3.69*
Absolute fit	Root Mean Square of Error Approximation (RMSEA)	<0.08	0.06
	Goodness of Fit Index (GFI)	>0.90	0.97

Note: * indicates Wheatson, B., et al., (1977) ratio of normed chi square to df is < 5 which is a reasonable value. The ratio obtained in the present study was 3.69 and hence it could be inferred that the value is reasonable to judge that the model has parsimonious fitness.

Convergent validity: Average Variance Expected (AVE) and Composite reliability (CR) were quantified to test convergent validity. The value of AVE and CR were 0.68 and 0.96 for the scale under consideration.

Concurrent validity: A Yoga Self Efficacy Scale (YSES) developed by Birdee, G. S., et al., (2015) with 3 constructs and 12 items was selected to test concurrent validity of the present scale. YSES has been developed to measure self-efficacy among the practitioners of Yoga in American context. The tool has been evolved based on the theory of self-efficacy. YSES has robust internal consistency with Cronbach's alpha value of 0.93 and good construct validity measures. When the scale was administered in our study, it had Cronbach alpha value of 0.87. The scores of the scale developed in the present study were correlated with YSES. Since the data were not normally distributed, non-parametric tool of association measurement namely Spearman's correlation coefficient was applied. Both the scores were positively correlated (ρ=0.87) and it was significant ($p<0.001$). Presence of criterion validity was proved due to positive and significant correlation coefficient between the newly developed scale and an established scale.

Reliability: Internal consistency of the 12 item scale was assessed by calculating Crohbach's alpha measure, Spearman Brown coefficient and composite reliability measure. The Crobbach's alpha value was 0.96. Spearman-Brown coefficient of split half reliability was 0.97. Composite reliability measure was 0.96.

Inter-item correlations matrix data are shown in table 5. The ideal range of average inter-item correlation is from 0.56 to 0.72 and these items are close and almost repetitive. All questions had values of .50 or higher, thus demonstrating that the observed variable questionnaire give consistent and appropriate results (Borg, I., et al., (2017).

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Q1	1											
Q2	**0.678**	1										
Q3	0.652	**0.708**	1									
Q4	0.71	0.709	**0.722**	1								
Q5	0.67	0.734	0.713	**0.689**	1							
Q6	0.635	0.69	0.748	0.691	**0.699**	1						
Q7	0.721	0.648	0.608	0.634	0.646	**0.557**	1					
Q8	0.695	0.799	0.697	0.71	0.69	0.658	**0.625**	1				
Q9	0.68	0.711	0.767	0.733	0.715	0.68	0.612	**0.693**	1			
Q10	0.653	0.692	0.666	0.749	0.681	0.648	0.688	0.69	**0.684**	1		
Q11	0.675	0.687	0.691	0.715	0.754	0.682	0.632	0.746	0.722	**0.674**	1	
Q12	0.658	0.69	0.684	0.722	0.719	0.802	0.601	0.704	0.716	0.671	**0.702**	1

DISCUSSION

In the present study, we developed a yoga nidra scale (YNS) to measure the positive beliefs. In study1, we developed a conceptual frame of yoga nidra on the basis of Swami Satyananda Saraswati. The belief the people have in the educational institutions is that yoga nidra practice will help the students in better academic performance. The qualitative characteristics and the experiences shared by the participants are similar to the experiences (Chandra Tripathi, R. (2018). Feeling relaxed after yoga nidra is a common experience which we have analyzed in this paper as an item loading factor and found to have a good correlation factor. The other qualitative characteristics were also put in the form of item questionnaire in 1-5 rating scale and were also analyzed and shown in study 3. The hidden latent variables were confirmed in CFA analysis. The final scale consisted of 12 items, which produced a latent variable viz; academic performance through yoga nidra (APYN). Systematic steps were followed in developing the scale literature of psychometric research were adopted to develop this instrument. A model is

considered to be valid when the Goodness of Fit (GoF) Indices calculated from the data is within the accepted ranges. The research community, over the years, has developed a number of GOF Indices to test the construct validity. The GoF Indices are categorized into three groups; namely absolute fit indices, incremental fit indices and parsimonious fit indices. Absolute fit indices are a quantity of degree of fitness of the model to the empirical data. They offer the most fundamental measure of the fitness (Hair, J. F., 2010). Goodness of Fit Index (GFI) is another absolute fit index. According to Tanaka, J. S., and Huba, G. J., (1989) GFI is equivalent to R^2 in regression analysis. In the lines of R^2 measure, for GFI also Adjusted index is calculated (AGFI). Root Mean Square Error of Approximation (RMSEA) is a population based index and is less sensitive to sample size. Tucker Lewis Index (TLI) has values range between 0 and 1. Models with values close to 1 show better fit. Likewise, Normed Fit Index (NFI) values range from 0 to 1 and values above 0.95 indicate better fit (Hoon Song, J., et al., 2011). According to Hair, J. F., et al., (2010) a parsimonious model is significant to prove that the postulated model fits the data in comparison with a complex model. According to Wheaton, B., et al., (1977) the ratio of Normed Chi square/df is reasonable. The ratio obtained in the present study was 3 and hence it could be inferred that the value is reasonable to judge that the model has parsimonious fitness. The researchers conducted EFA and CFA to assess validity and factor (construct) structure of the new scale (Barry, A. E., et al., 2011). The results of CFA supported the originally hypothesized one-factor structure (Perceived benefits of Yoga). Both the analyses confirmed that the new scale can be used as a tool to measure perceived benefits of Yoga with particular reference to oral health behavior among the individuals. The score of the new scale positively and significantly correlated with the standardized scale namely Yoga Self-Efficacy Scale to prove existence of concurrent validity.

LIMITATIONS OF THE STUDY

There were certain limitations in the study. Convenience sampling technique was used in the present study. Blankson, C., et al., (2007) insists generalizability of the results and hence they do not recommend convenience sampling. Considering separate samples for EFA and CFA is recommended by Morgado, F. F., et al. (2018). The researchers, however, used same sample for EFA and CFA.

CONCLUSION

Results of the present study have found a base and opened up new avenues for further research to develop a more comprehensive scale using additional psychometric testing. Further validation of the new scale needs to be done through longitudinal studies to assess the causal associations between the factors of the new scale. The present study has been

undertaken in a cross sectional setting with limited number of samples. Further studies in different contexts with large number of samples will be required to further validate the scale.

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Author Contribution: The main author is the administrative head and the remaining co-author contributed to the data analysis and its statistical interpretation.

Compliance with Ethical Standards

Disclosure of potential conflict of interest: Authors and co-author declare that they have no conflict of interest to this work.

Research involving human participants and/or animals: This article does not contain any studies with animals.

Informed consent: Informed consent was obtained from all individual participants included in the study.

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