'Non-duality' and 'Reliance' are the 'regression refined principal components' that influences 'spirituality' in 'Indian Saints'.

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Abstract

Background: Quantifying spirituality is a tough ordeal and pretty intricate considering its multidimensional nature. Religion and culture are its top exponents. An evaluating tool must envisage them as core components. A tool to measure spirituality by incorporating Hindu philosophy was hard to find. Thus, we choose the commonly studied SAI (Spiritual Assessment Inventory) questionnaire and attempted to extract refined components with significant predicting potentials which can pave the path for spiritual assessment among Indian Saints.

Results: The legitimate KMO and Bartlett's Test of significance of SAI for 1103 participants were .878 and 0.000; its Cronbach's α was .810. Extracted Communalities for all 54 items of SAI ranged from .404 to .709. PCA (Principal Component Analysis) analysed 1097 participants that yielded 2 Principal Components (PCs) having a total of 7 variables; 3 for PC 1 and 4 for PC 2. The PCs thus derived explained 59.48% of the total variance of the participant's spiritual score. The PCA for the two extracted components reported a Cronbach's α value of .69, the KMO and Bartlett's Test of significance of .748 and 0.000, and a linear regression R^2 value at .605, F .000 and sig. f change .000. Standardized Beta for extracted component variables ranged from .10 to .28 with a significance value of .000. Both the PCs had corresponding Eigenvalues > 1 . The corresponding Monte Carlo PCA test of parallel lines Eigenvalues was calculated to cross-check the PCA Eigen figure for their validity. The PCA Eigen figure was found tenable after cross-checking.

Conclusion: PC 1 with its 3 variables was named 'Reliance' and PC 2 with 4 variables were 'Non-duality' named. These two PCs accounted for to 59.48% of spirituality in Indian saints and demonstrated a strong positive prediction potential concerning spiritual scores (regression R^2 .605) in Indian Saints.

Introduction

The health paradigm has two protagonists: Spirit - Mind – Body and Body- Mind – Spirit. In eastern spiritualism, the 'Spirit - Mind – Body' paradigm is strongly prophesied¹⁻⁴. The first and the oldest component of the paradigm 'Spirit or spirituality' is a pretty complex issue. Its multidimensionality makes its empirical measurement harder⁵⁻⁷. Nevertheless, it can be stated that spirituality is now seen as a universal human phenomenon with huge potential for overall individual and global wellbeing⁸⁻¹⁰. India the 'land of spirituality' has constantly nurtured this concept since time immemorial¹¹⁻¹⁴. The local populace looks at the Saints as its propagators. But empirical documentation of this oldest domain among the mentioned saviours is far and few. One of the causes may be a lack of 'religion and culture-sensitive tool' to do so¹⁵. In this research an admired and authenticated SAI (Spiritual Assessment Inventory) instrument was explored for its local relevance¹⁶. It was then subjected to PCA (Principal Component Analysis) for extraction of prominent components that contributed to spiritual enrichment. Those contributors were scrutinised for their scientific assertion by a linear regression model for a closer

look at the role played by their constituting variables in influencing spirituality amongst studied participants.

Methods

Null hypothesis (H_0): All components and variables of SAI have equal contribution to spiritual development in Indian Saints.

The alternate hypothesis (H_1): There are select variables in SAI which can be grouped under fewer independent components which may significantly influence spiritual growth of Indian Saints.

Aim: The study aimed at quantifying spirituality by SAI and extracting valid 'Principal Components' out of them.

Objectives:

1. To score spirituality in numeric
2. To extract evident components by PCA analysis
3. To analyse them for their reliability and contributing aptitude in spiritual development in Indian Saints by a regression model

Study design: Cross-sectional data from Indian Saints attending Ujjain Kumbha Mela (riverside religious and spiritual mass gathering) were collected by SAI and subjected to PCA (Principal Component Analysis).

Methodology: SAI (a theistic selective instrument for the quantitative measure of spirituality and religion) was used for data collection from 1103 (10%) of Indian saints who attended the Kumbha Mela of 2016; the prestigious and holy riverside festival of faith, religion and spirituality held at the cultural city of Ujjain, Madhya Pradesh, India¹⁶⁻¹⁸. Prior training of investigators to standardize the interviewing process, followed by conduction of a pilot survey and its SWOT analysis was conducted before the initiation of the final study. Five Akhads (clans) representing the three important Hindu lineages; Shiva, Vishnu and Neutral/ Sikhs were randomly selected from a total of 13 that participated in the mega event¹⁵. Equality of participants from selected clans was ensured by systematic random sampling with a group interval of 10, and lineage proportionality was ensured by proportionate sampling method keeping representation of the clan lineage in mind. Thus 3 out of 7 Akhadas were selected from Shiva clans and 1 out of 4 each from Vishnu and Neutral clans. As the first step for sample estimation; 10% (205) participants from each select clan were chosen for study purpose thus yielding an initial sample figure of $205 \times 5 = 1025$ participants. Additional 10% (102) participants were added to this initial figure considering the approximate decadal increment in participant number over and above the last Mela figure. Thus, the final sample estimate was 1127 ($1025 + 102$) consenting participants/saints.

The spiritual score for individual participants was generated in accord with SAI guidelines. SAI tool consisting of 54 variables was scored on Likert Scale of 1 to 5, which recorded the responses ranging from 'not at all true' as '1' to 'very true' as '5'^{15,16,18-20}. The select inventory was subjected to PCA suitability by conducting Reliability Statistics (Cronbach α), Kaiser-Meyer-Olkin Measure for Sampling Adequacy, Bartlett's Test of Sphericity for hypothesis testing. Standard 'Varimax rotation' was adopted as the components proved to be nonlinear (independent/nonrelated) by 'direct oblimin method'^{21,22}. The component extraction was done by fixing factor Communalities at > 0.4 , component initial Eigenvalues > 1 , and a factor loading of $> .45$ to suppress small coefficients. The validity of component Eigen value was confirmed by the corresponding MCA Test of Parallel Line fitness analysis²³⁻²⁷.

Extracted components are presented as Scree plots, component plots in the rotated matrix, naming of components with factor loading, component reliability statistics in terms of Cronbach's α and item predictability by the linear regression model.

Data analysis was done by SPSS version 20 and Monte Carlo Analysis Test of Parallel Line for extracted components fitness analysis²¹.

Results: We were able to collect data from 1103 participants. On screening for completeness of data, 1097 (99.45%) participants provided complete information on all 54 studied variables. SAI as an assessment tool was found to have a better unidimensional internal consistency reliability (Cronbach's α .81)²³⁻²⁵. Exploratory Analysis in the form of 'The Bartlett's test' and 'Kaiser-Mayer Olkin measure' was applied to the data for verifying the legitimacy of conducting PCA²⁸⁻³¹. Suitability for PCA analysis of the data set was affirmed by a meritorious KMO sampling adequacy value of .878 and Bartlett's Sphericity significance level at .000 which favoured the alternate hypothesis³²⁻³⁴. The extracted Communalities value for all 54 variables ranged from .404 to .709, indicating their meaningful contribution in variances explained. In accord with the established standard, the recommended Communalities value of $> .40$ was employed to suppress small coefficients. All these analytical measures collectively enhanced fitment, validity, and reliability of study objective thereby rejecting the null hypothesis³⁵⁻³⁸.

As an initial analysis, variables were subjected to Direct Oblimin Rotation in PCA and their component correlation matrix was analysed. None of the components suggested the presence of established co-relationship (value $< .30$) thereby suggesting the adoption of orthogonal rotation as the chosen method for component extraction. The commonly used Varimax Orthogonal Rotation was used for final analysis^{39,40}.

By running PCA with the above-mentioned model fitness criteria we were able to extract 3 components with 12 variables explaining 53.80% of the total variance. But when they were subjected to multilinear regression analysis 1 of the select 12 variables namely; variable(question) number 7 from instability

subsection of SAI, which says ‘there are times when I feel God is angry at me’; was found non-redundant (supplementary table number 1). This variable was subsequently dropped/excluded and PCA was redone keeping all other preconditions unaltered. The final result led to a 2 component PCA with 7 variables that explained 59.48% of the total variance. All those 7 components recorded an acceptable overall reliability scale (Cronbach's α score of .695; with a range of .697 to .725).

As the development of spirituality is subjected to multiple domains with intradomain correlations it was unlikely that each extracted variable would record an individual $R^2 > .5$. Therefore, regression analysis was carried out under ‘unit assumption’ for the 7 extracted variables. It was observed that 7 of them together significantly influenced spirituality (R^2 .605).

The above-reported results are presented in the following sequences. The 7 extracted variables along with their respective domains are presented in table number 1. The higher mean scores, narrow standard deviation and acceptable component/factor loading of $> .4$ lend initial support in favour of their selection as dominant players⁴¹.

Table Number 1
Descriptive Statistics of extracted variables

Variables	Mean	Std. Deviation	Participants
I work harder to restore divine connect on a difficult time (RA2**)	3.26	1.15	1097
my trust in God stays mostly un-wavered may come what (RA7**)	3.09	1.43	1097
I am able to come to sense and work on restoring our relationship on fractious occasions (RA3**)	3.28	1.10	1097
On the feeling of betrayal by Almighty, my effort in relationship-repair stays un-dampened (RA5**)	3.38	1.08	1097
God recognizes my strong spiritual ability (G2**)	3.40	.98	1097
My experience of God's response has a great impact on me (A5**)	3.46	.93	1097
My needs are more important to God than most others (G3**)	3.21	1.13	1097

*RA: Realistic acceptance, A: Awareness, and G: Grandiosity. **These numbers represent the item under the above-mentioned subcategories.

Table number 2 demonstrates individual and cumulative variance (59.48%), explained by the two extracted PCs. This figure lies within the standard acceptable range of 40% to 60%⁴². The corresponding Eigenvalues of the components at 2.537 and 1.627 are well above the customary cut-off value of 1^{43, 44}. The initial PCA Eigen values were cross-checked against their corresponding Eigen values generated by Monte Carlo PCA for the parallel line. The selected 2 PCs were found tangible/retainable after cross-checking. (Supplementary table number 1).

Table Number 2

Individual and Cumulative variance of studied components along with their Eigen values

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.537	36.23	36.23	2.537	36.23	36.23	2.206	31.51	31.51
2	1.627	23.24	59.48	1.627	23.24	59.48	1.958	27.96	59.48
3	.659	9.41	68.89						
4	.620	8.85	77.74						
5	.544	7.76	85.51						
6	.535	7.64	93.15						
7	.479	6.84	100.00						

*Extraction Method: Principal Component Analysis

The Scree plot, it’s interpolation line and Eigen values of principal components are presented in figure number 1. The two components above the elbow were the final detainees for further exploration.

Figure number 2 depicts the rotated factor loading for the selected 2 PCs both at origin and in spike centroid axis. Both of them presents the ‘inter-component independency’ and ‘intra- component dependency’ of select factors thereby justifying component nonlinearity. It is seen that A5, G2 and G3 loaded under Component 1 and RA2, RA7, RA3 and RA5 loaded under component 2 (figure number 2).

The two extracted core components were named ‘Nonduality’ and ‘Reliance’ considering the nature of variables which loaded under them. All of them had good component loading scores (>.5) thereby indicating strong intra-component correlation. Table number 3 presents the details in this regard.

Table number 3

The naming of extracted Component along with factor loading

Principal Components	Variables	Component loading
PC 1 Reliance	A5 (My experience of God’s response has a great impact on me)	0.787
	G2 (God recognizes my strong spiritual ability)	0.784
	G3 (My needs are more important to God than most others)	0.772
PC 2 Nonduality	RA2 (I work harder to restore divine connect on difficult time)	0.803
	RA7 (My trust in God stays mostly un-wavered may come what)	0.767
	RA3 (I am able to come to sense and work on restoring our relationship on fractious occasions)	0.716
	RA5 (On the feeling of betrayal by Almighty my effort in relationship-repair stays un-dampened)	0.657

* Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization

Next, the reliability score of SAI questionnaire along with the extracted components was estimated by Cronbach α . All of them had good estimates which also renders supports the study hypothesis (H_1). The reliability score (Cronbach's Alpha) for the final PCA model along with extracted components is presented in table number 4.

Table Number4

Reliability Statistics for SAI and extracted components

omponents	Cronbach's α				No. of Items
components	Cronbach's Alpha	.69	Standardized Cronbach's Alpha	.70	7
(Reliance)	Cronbach's Alpha	.69	Standardized Cronbach's Alpha	.70	3
2(non-duality)	Cronbach's Alpha	.72	Standardized Cronbach's Alpha	.73	4

As a final step linear regression analysis was carried out to find the predictive power of extracted variables. Recognizing the multi-domain nature of spirituality, we opted for the concept of unit assumption for regression analysis. Here we assumed all extracted variables as one 'unit variable' and subjected it to the regression model. The regression model generated a favourable R^2 value at .605 and The ANOVA supported linear regression model validity with F at 238.23, and sig, 0.000. The linear regression findings are presented in table number 4.

Table number 5

Linear Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.778 ^a	.605	.602	9.93926	.605	238.239	7	1089	.000

a. Predictors: (Constant), A5, RA2, G3, RA5, RA7, G2, RA3; b. Dependent Variable: Spiritual Score

To establish the contribution of each selected variable to the above all spiritual scores in study participants, their 'standardized β ' was calculated. The 'standardized β ' for all extracted variables were found to have high statistical significance (.000). These details are presented in table number 5.

Table number 6

Coefficient Table

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	100.549	1.581		63.595	0.000	97.446	103.651			
	RA2	1.965	.318	.144	6.173	.000	1.341	2.590	.369	.184	.118
	RA3	2.681	.328	.188	8.161	.000	2.036	3.325	.496	.240	.155
	RA5	2.137	.322	.147	6.637	.000	1.505	2.769	.456	.197	.126
	RA7	1.197	.248	.109	4.824	.000	.710	1.684	.344	.145	.092
	G2	3.535	.368	.220	9.602	.000	2.812	4.257	.529	.279	.183
	G3	2.409	.306	.173	7.862	.000	1.808	3.010	.444	.232	.150
	A5	4.862	.385	.288	12.620	.000	4.106	5.618	.558	.357	.240

a. Dependent Variable: Spiritual Score

Discussion

The teachings from Hindu culture are a protagonist of Spirit – Mind – Body paradigm. Spirituality is considered as the essence of healthful living. All available scriptures are in tune with this concept. In one hand Hindu spirituality has always thrived on the concept of ‘non-duality’; a strong sense of connecting with the creator by realistic acceptance of his creation, and in the other; a sense of surrender to the supreme by ‘Reliance’. Both these components cement the all-inclusive ‘transcendental’ approach in achieving spiritual growth.

To explore this concept data from an exertive descriptive study involving 1097 participants was subjected to dimensional reduction and core component extraction by Principal Component Analysis. The study sample met all the prerequisites considered conducive for running an effective PCA; i.e. testing sample adequacy by KMO, hypothesis testing by Bartlett’s test of Sphericity and Eigen values for component selection^{23-25, 28-31 & 35-38, 43,44}.

This exercise yielded 2 core components consisting of a total of 7 variables, which cumulatively explained a high percentage (59.48%) of variance in spiritual score^{36,38}. As a next step, the extracted core components were named keeping their constituent variables in mind. The 2nd component explaining 23.24% of the spiritual score was named ‘Nonduality’. It had 4 variables all of which were from RA subscale and pointed at a strong desire and sustained effort to stay associated with divinity or God (Fig. 2 and table number 3).

The ‘distinction and definition’ ambush between spirituality and religiousness is a topic of grand eternal debate. While some consider spirituality as a subset or superset of religiousness (Zinnbauer and Pargament religiousness2005; Zinnbauer et al. 1999), others opine religiousness as the most popular form of spiritual life that drives one to transcend the material sphere⁴⁵⁻⁴⁷. Though there are many definition difficulties, one thing that emerges as the front runner (core component) is the desire to

transcendence i.e. going beyond or above one's "physical self"⁴⁸⁻⁵⁰. This can happen through a combination of personal and as well as a religious domain which we have coined as 'nonduality'^{51,52}. Nonduality identifies one as the part of the cosmos and prompts one to dissolve all personal boundaries to embrace the divine creation. This inclusiveness is fundamental to transcendental reform. Indian saints are in constant pursuit to spiritual transcendence by leading a dedicated religious life as seekers of truth through four major practices, namely; devotion, karma, body energy management and constant seeking for knowledge. This dynamic character of spirituality prompted many to consider its multidimensional nature and even some name it as the 'sixth domain of personality'⁵³. Researchers also have identified positive spiritual and religious copings behaviors⁵³. Positive religious coping strategies are based on solid, trustful and safe relation with God which has confirmed beneficial health impacts⁵⁴⁻⁵⁷. Transcendence can assume different directions: self-improvement of oneself, deepening relations with others, building the sense of unity with nature or attachment to and trust in the Divine Being. Miller and Thoresen along with Hill et al. also observed that spiritual coping with stress can be defined as an attempt to overcome the stressor based on what is transcendental approach^{58, 59}.

The 1st component explained 36.23% of the variance in the spiritual score. It was named 'Reliance' and had 3 variables loading together that explains the significance of divine influence in the day to day functioning of Indian saints (Fig 2 and Table number 3). Studies have identified the significance of maintaining solid relationships with God/the Supreme Power, based on the sense of presence, love and trust (the religious domain)⁵⁸. Thus 'Trust & Acceptance', opens up another rich area of inquiry. Here accepting what is, integrating the new status of affairs, making sense of them coherently, demonstrating flexibility and resilience, and moving forward with a trusting attitude are identified as major influencers in meeting one's needs in spiritual spear⁵⁹.

Finally, the core variables contributing to the extracted factors were subjected to multilinear regression analysis. The MLR model was found sustainable with R at .778, R² at .605 and adjusted R² at .602 with a sig. F at .000. Standardized β coefficient for influencing variables was estimated to evaluate the impact of a unit change in each of them with the corresponding changes on the total spiritual score. It was observed that per unit change in predictor variables there were highly significant changes (.000) in the spiritual score of participants. For example, a unit change in A5 (divine influence in day-to-day activities) can lead to a corresponding increase in the spiritual score by 28 points. Similarly; per unit change in G2(devotional spiritual quest or surrender to almighty), RA3(relationship restoration), G3(divine favour), RA5 (repair of relationship), RA2 (trust) AND RA7(divine connect) the corresponding increase in spiritual score will be by a margin of 22, 18, 17, 14 and 10 points respectively (table number 5).

So, the present analysis renders empirical support to the age-old hypothesis; that transcendental reform is dependent on nurturing a 'non-dual' and 'reliance' conduct. The instrument SAI has 6 scales and 54

variables out of which the major contributors to spirituality in Indian saints were concentrated to 2 components consisting of 7 variables that were derived from 3 subscales.

Strengths and Limitations

This study has several important strengths. The most important being it's a large and representative sample size of 1103 participants all belonging to one religion. The percentage of missing data was merely 0.5% (6 cases). All variables (54) had High (>.4) extracted communalities and sampling adequacy (KMO .878). Fitment of extracted components to MLR model further rendered strength and support to the study. Other strong areas were conduction of a pilot survey to access feasibility issues, 2 weeks training workshop of team members before initiation of the study to ensure uniformity in information retrieval, and immediate SWOT (Strength, Weakness Opportunities and Threat) analysis based on feedback from the day's 'on-field activities' to maintain high morale of research staffs and ensure good quality data.

Limitation: The tool used was not culture and religion-specific thereby leading to some information bias because of comprehending issues. The scope for respondent bias cannot be overruled as the tool used respondents' repose for scoring the variables.

Conclusion: Spirituality in Indian saints is mainly transcendental where one tries to rise above one's physical being. The main factors responsible to achieve this are conceptualized in 'nonduality' and 'reliance'. Nondual relationship demolishes one's physical existence and drives one closer to the divine whereas reliance on divinity or God paves the path to transcendence. These components and their constituent variables should be kept in mind while designing a socio-cultural evaluation tool of spirituality from the Indian context.

Declarations

Conflict of interest: The author declares 'no conflict of interest'.

Ethical permission: The study had ethical clearance from IEC. Via IEC Ref. No. 52/2016

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Figures

Figure Number 1

Scree plot with Eigen value and interpolation line for extracted components

Figure 1

Scree plot with Eigen value and interpolation line for extracted components

Figure number 2

Component rotation of 2 PCs at Origin and Centroid locations demonstrating their nonlinear nature and intra group correlations

Figure 2

Component rotation of 2 PCs at Origin and Centroid locations demonstrating their nonlinear nature and intragroup correlations

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