

Measures of Superstitious Beliefs: A Meta-Analytic Review of Research

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Superstition is a term which is widely used across the globe but, is understood differently by people from different cultures. Superstitious beliefs are challenged by emerging scientific knowledge, and they continue to persist even among advanced societies. In recent years, superstitions are viewed as a belief in luck. The instruments that are available to assess this phenomenon are few and have insufficient psychometric properties. There is a need for developing new standardised measures which explore the complex, conceptual nature of superstitions. A meta-analysis of existing literature was done to explore the existing measures of superstitious beliefs and to examine the relationship between reliability of scales and the various attributes of scales. A literature search was conducted in relevant databases. Suitable transformation procedures for coefficient alpha were used. Meta-regression analysis was done to explore the heterogeneity of data. 41 scales measuring superstitions were analysed. Results indicate that reliability coefficients were from heterogeneous samples. Regression analysis revealed that few characteristics of scales predicted reliability.

Keywords: Superstitions, Luck, Beliefs, Meta-analysis, Reliability, Meta-regression

Superstition has always been a topic of great interest and has enticed researchers and philosophers alike for many years. Even in the present day, it is a widespread phenomenon with the strong presence and shows no signs of fading out (Jahoda, 1968; Kramer & Block, 2008; Vyse, 1997; Sagone & De Caroli, 2014). Apart from the mystery behind the topic, the quest of trying to fit the concept in to a clear box, separating it from paranormal or religious beliefs, it has made research in this area much more arduous. Interest in measuring superstitious beliefs across various groups of people has grown over the years. The individual or collective perspective of superstition was one of the main factors that influenced not only daily activities but also businesses, market economy and even medicine (Block & Kramer, 2009; Lindeman & Saher, 2007).

Scientific investigation of superstitions requires quantifying the phenomenon of superstitions. The availability of a sound instrument to measure superstition is vital for making significant strides in future research. Researchers have used diverse ways of studying superstitions. However, a detailed exploration of

these measures of superstitious beliefs and their measurement properties is lacking.

Over the years, different scales were developed to measure superstition. Many investigators used self-report questionnaires to understand and quantify the phenomenon, but most of these instruments are deficient in high psychometric properties (Gallagher & Lewis, 2001; Tsang, 2004). There are attempts made by few researchers that reviewed existing superstition scales. However, the adequacy of psychometric properties were not examined.

Measuring superstition has proved to be more difficult for varied reasons. The lack in defining the concept rigorously has been one of the significant limitations (Delacroix & Guillard, 2008). Many of the early researchers developed questionnaires and self-reports, but these instruments have an inaccurate understanding of the superstition. There was no consensus among authors about what constituted superstition. Effective empirical research should pay equal importance to conceptualise the construct in a manner, which is rigorous and is widely accepted.

Earlier researchers used the term paranormal beliefs synonymously with superstitiousness. The boundaries between religion, paranormal beliefs and superstitions were vague. Hence, some superstition questionnaires also include many items relating to various paranormal phenomena rather than just limiting items to only superstitious beliefs (Irwin, 1993). Superstitions are defined as the attribution of occult or supernatural causes, falsity in beliefs or behavioural terms of accidental correlation due to reinforcement (Skinner, 1948; Warren, 1934; Zapf, 1945).

Over the years, other dimensions have been used to define the construct of superstitions. They are considered as widely held beliefs which incorporate magical causation as an element. They were also regarded as popular beliefs, which are socially shared and considered as tenets based on ignorance (Jahoda, 1968). Superstitious beliefs were viewed as an attitude of mind which is irrational (Parida, 1962), as ideas about reality which are wrong (Beck & Forstmeier, 2007) and as illusory irrational correlations (Haselton & Nettle, 2006). They are also defined as something inferred from identification of reasoned and consequential interrelationship among a set of unrelated random stimuli (Whitson & Galinsky, 2008). Several authors also understood superstition as the inaccurate establishment of cause and effect (Zebb & Moore, 2003; Foster & Kokko, 2009). In the recent years, the concept has been defined variously in terms of belief in good or bad luck, the ability to change luck and cognitive-behavioural explanations (Brevers, Dan, Noel, & Frédéric, 2011; Fluke, Webster, & Saucier, 2014; Mundada, 2013, Thompson & Prendergast, 2013). The lack of a universal definition for superstition has therefore led to various issues in measuring the concept effectively.

Most of the existing work on superstitious belief is based in the western cultural context. However, superstitions may be presented in different forms and influenced by various factors across different cultures (Huang & Teng 2009). There are vast cultural differences in superstitious beliefs. Individuals across cultures can hold varied kinds of superstitious beliefs which are more prevalent and unique to their

cultures. One of the conundrums for the experts is to understand the cultural aspect of measuring superstition.

The scale to measure the tendency for superstition in Iran (Safaei & Khodabakhshi, 2012), the Unsubstantiated Belief Inventory (George & Sreedhar, 2006) and the scale to measure superstition in the rural area of Bangladesh (Huque & Chowdhury, 2007) are available and they would match the Indian context as well.

A few scales in the western context are Revised Paranormal Belief Scale (Tobacyk, 2004), Belief in Superstition Scale (Fluke, Webster, & Saucier, 2014), and Superstition Questionnaire (Wilson, 2011). Most scales have been developed from previous existing scales with the incorporation of minor or major changes. These changes in the listed questionnaires include modification in the language used in the scale, inclusion/exclusion of various cultural superstitions that have been added or removed to suit the cultural context of the scale, and the use of interviews to fill the gap in the data that the questionnaire failed to measure (Zhang, 2012; Dean, 2013). Another important reason for difficulties in measuring superstitions is the inclusion of both popular and traditional superstitions as items in these questionnaires. Although it is important to have a list of superstitions as items in questionnaires, the validity of using these measuring instruments outside the location of where they were developed is questionable (Fluke, Webster, & Saucier, 2014).

Lack of reliable and valid instruments is one of the major obstacles in measuring superstitions. Early studies in this area required the participants to recall the various superstitions they held (Dresslar, 1907). This method was replaced by the development of self-report measures, that used a representative sample of superstitious beliefs rather than eliciting a list of superstitions being practiced (Nixon, 1925). With the advent of comprehensive psychometric procedures, contemporary researchers have focussed on developing both a reliable and valid index to measure superstitions (Fluke, Webster & Saucier, 2014; Sagone & De Caroli,

2015). However, the attempts have not been comprehensive.

One of the biggest challenges in measuring superstitions is that most people when asked do not accept that they are superstitious. People are unwilling to own up to their irrational beliefs, even though many of them do indulge in or hold illogical thoughts or practices (Mowen & Carlson, 2003). This aspect needs to be given importance while developing items for the questionnaires. There is a dearth of empirical support about factors that lead to superstition in a person. A scale which is multidimensional in nature is required to identify the range of superstitious behaviours; such a scale is likely to be more reliable too. The conceptualisation of superstition within different contexts has led to several challenges in measuring superstition. The researcher also needs to take into consideration various factors that can affect the outcome of the study. Hence, it is imperative to choose the right instrument to facilitate accuracy of the results and the measurement of properties of the instrument are very important factors in this regard.

It becomes important to pay explicit attention to examine the measurement properties of scales. Genuine concern towards the proper quality of psychometric properties of these scales is on the rise, but the lack of literature about the empirical evidence on the effects of research design, attributes on reliability and validity of scales is a serious concern (Churchill & Peter, 1984).

Synthesizing information from existing literature on the instruments measuring superstitions can provide us with an empirical frame for an effective future scale development. It will be very useful for researchers working on new superstition instruments to understand how the attributes of the sample, scale characteristics, and methods of scale development procedures can affect the psychometric attributes of scales. This knowledge will lead to developing new tools that do not follow the past ineffective techniques that lead to poor scale properties (Davis-Kean and Sandler, 2001).

Influence of research design characteristics on the reliability of the scale was observed

in studies conducted in marketing (Peter & Churchill, 1984). The objectives of the study were to evaluate and examine the relation between reliability coefficient of the existing superstitious belief scales and sample attributes, measure attributes and measure development attributes using the meta-analysis framework.

Meta-analysis is a powerful quantitative approach which involves the use of statistical procedures on pooled data from various individual studies. It obtains the effect of magnitude index with confidence intervals and statistical significance (Huedo-Medina, Sánchez-Meca, Marín-Martínez, & Botella, 2006). Studies based on meta-analysis of reliability coefficients are numerous and have been conducted for decades.

Method

A systematic review was undertaken to portray together information about the various instruments developed to measure superstitions. A literature search was methodically conducted to identify relevant studies which used instruments to assess superstitions.

Search Strategy and Inclusion Criteria

A broad review of articles based on keywords was done due to the paucity of instruments to measure superstitions. Recent studies have suggested that people in general, idiomatically refer to superstitions as avoiding bad luck or bringing good luck (Fluke, Webster, & Saucier, 2014). Hence, studies which focused on measuring beliefs about luck were also considered for inclusion in the present study even though the authors have not used the term superstitions in their work. These studies were also included to incorporate a broader definition of superstitions. A search of the electronic databases was carried out initially. PubMed, Ebsco, Jstor, Proquest, and Google Scholar were searched for relevant articles till February 2016. Terms of 'Superstitious beliefs', 'superstitions', 'luck', 'instruments', 'measures' were used to search for related articles. Other sources of information namely bibliographic information from articles and chapters from books were also examined. This review led to a population of instruments measuring

superstitions. It is possible that all the measures of superstitions were not considered as some of them might not have been published or may not have been retrieved through search criteria.

Research articles identified were then screened based on the following inclusion criteria (a) only studies published in English, (b) studies published between 1900 and 2016; (c) Studies, which used measures which comprised of items that reflect superstitions; (d) Studies explaining the scale development by authors. The exclusion was implemented when studies described (a) subjective instruments like interview schedules, narratives, (b) compilation of superstitions, (c) conceptual papers, (d) review articles, (e) studies referring to scales developed by different authors.

All articles which did not meet the above criteria were rejected. Titles were then screened for duplicates. As the search terms were broad, the initial search strategy found 21,804 numbers of studies. Seventy-Eight instruments were identified which satisfied the specified inclusion and exclusion criteria.

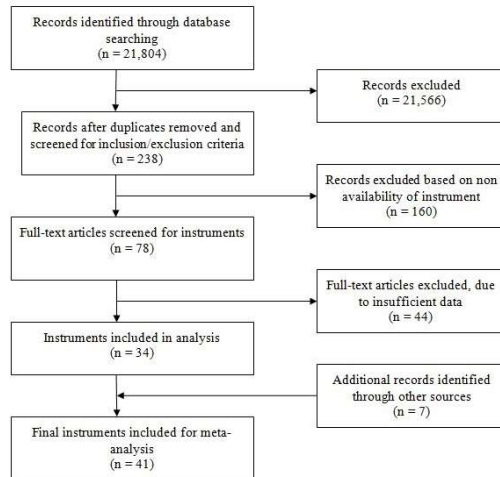


Figure 1.Flow diagram indicating search strategy and results

The instruments were reviewed second time manually to include only those measures which reported adequate psychometric information. Thirty-four instruments met these criteria and seven instruments were added based on the

search using keywords of instruments from the bibliography. Only one study using each instrument was considered for analysis. Towards the end of this phase, forty-one instruments were included for final analysis.

Data Extraction

A form was prepared for collecting priority information from the studies. The information about the year of publication, authors, sample description, region of study, study design, dimensions of scale, psychometric properties were collected from each study. Forty-one instruments screened for the study were then coded using a coding scheme. Table 1 and 2 gives the descriptive details for both continuous and dichotomous variables. Reliability coefficients are used as a quality estimate in the present study. All the types of reliabilities were considered for coding but, when multiple measures of reliability were reported for an instrument the following order of coefficients was considered to identify the dependent variable (a) alpha coefficient; (b) split half at single point; (c) Spearman-Browns; (d) alternate forms; (e) split half at two different points in time; (f) test-retest reliability. This choice is based on the recommendations by Nunnally (1978) for consideration of reliability indices.

For few studies, which did not report the reliability of the overall instrument but instead reported subscale reliabilities, the procedures followed by Davis-Kean and Sandler (2001) were followed. The overall reliability coefficient was created by averaging the reliabilities. Since, this may not reflect the actual reliability of all the items on the scale, adjustment for the number of questions was made. The number of items, when adjusted by reduction, reflected the number of items in subscales. For this study, the average reliability created represented the mean of dimensions and number of items in each subscale.

To gather more information about every instrument, specific information about the instruments was collected for coding. Data about the year in which the scale development article was published, the total sample size on which the study was conducted, the age of the subjects was also coded. Many authors did not report the

age range of the participants. The mean age of the participants was reported only in twenty-one studies. Gender and socioeconomic status of participants was also considered for coding. Most of the studies have not reported any details on this aspect and hence were not examined for analysis in this paper.

Information about the instruments like the nature of the measure, the total number of questions in the scale, the presence of dimensions, the presence of reverse coded items and the number of response options for each question was also considered for analysis. For instruments in which superstitiousness is only one of the subscales with its own reliability was considered as a standalone scale.

The presence of dimensions for this study is defined as instruments tapping multifactor nature of superstitiousness. The number of response options for each item was coded as a dichotomous variable considering response category and response options less than three as one group and response options of more than three as another category.

Data was also coded by considering the information on how the authors created their instruments. This included not only analysing the information on how the test items were generated but, also on exploring the dimensionalities and examining the empirical procedure used in exploring the dimensions. Dichotomous variables on whether the domain being measured was defined, whether the dimensions were identified prior or not and if the dimensions were investigated empirically using exploratory and confirmatory factor analysis were coded.

Data Analysis

For the meta-analysis, Fisher's variance-stabilizing z transformation is used in most

of the studies. However, Sawilowsky (2000) critiqued that Fisher's transformation is more relevant for alternate form and test-retest reliabilities but, not for internal consistency as it is not considered as correlation. Hence, a more suitable transformation for coefficient alpha proposed by Hakstian and Whalen (1976) and the procedures suggested by Rodriguez and Maeda (2006) are considered for analysis.

The present research followed the basic procedures laid down by Rodriguez and Maeda (2006). These procedures suggest weighing of effect sizes "based on the function of precision of each effect". This is estimated with different precision level as they are derived from different studies. Effect sizes were initially transformed to make them more normally distributed. Weights were then assigned to them by their inverse variances and weighted mean, which transformed the effect size and was computed. The reliabilities reported in this study were predominantly coefficient alpha, but few of the studies also reported test-retest and split half reliabilities. However, the guidelines and recommendations proposed by Rodriguez and Maeda were considered relevant for other forms of reliabilities as well and are applied for transformation (Sánchez-Meca, López-López, & López-Pina, 2013).

After the transformation of effect sizes, mean weighted effect sizes and confidence intervals were computed and homogeneity of the data was explored. Cochran's Q test is used to measure the homogeneity or heterogeneity in the meta-analysis (Table 3). Q test is obtained as the weighted sum of squared deviations of individual study effect from the pooled effect across studies.

Results

The descriptive details of all the continuous variables are presented in Table 1. Forty-one

Table 1 . Descriptive characteristics of Continuous Variables

Variable	N	Mean	SD	Kurtosis	Skewness	Ranges
No. of Items	41	20.63	21.768	23.293	4.404	6-140
Reliability	41	.83	.847	-0.619	- 0.517	0.655-0.960
Year	41	2005.88	11.591	19.175	- 3.878	1945-2015
Sample Size	41	366.83	661.808	34.487	5.687	96-4339

Note. N = total sample size; SD = standard deviation

Table 2. Descriptive characteristics of Categorical Variables in the Analysis

Variables	Frequency	Percentage
Location		
U.S.A, Europe, Australia (1)	31	75.6
Other countries (2)	10	24.4
Nature of measure		
Belief (1)	26	63.4
Behaviours (2)	9	22.0
Attitude (3)	1	2.4
Combination (4)	5	12.2
Method of data collection		
Mail (1)	6	14.6
Telephone (2)	1	2.4
Face-to-face (3)	34	82.9
Dimensions present		
Yes (1)	21	51.2
No (2)	20	48.8
Reverse scoring used		
Yes (1)	7	17.1
No (2)	34	82.9
Defined the domains		
Yes (1)	34	82.9
No (2)	7	17.1
A-priori dimensions		
Yes (1)	34	82.9
No (2)	7	17.1
EFA done		
Yes (1)	26	63.4
No (2)	15	36.6
CFA done		
Yes (1)	8	19.5
No (2)	33	80.5

Note. EFA done= Exploratory Factor Analysis done, CFA done = Confirmatory Factor Analysis done

Table 3. Homogeneity Test Results

Summary	Analysis
Total studies	41
Wtd mean effect size	.8318
WtdSD	.079
95% CI	.8063- .8573
Min. - Max.	.590- .960
Homogeneity Q	1347.4086, p<0.01

Note. 95% CI= 95% credibility interval, Wtd mean effect size = Weighted mean effect size, Wtd SD = Weighted standard deviation

scales on superstitious beliefs constituted the final sample. Reliability which is the main variable of the study and which represents the quality of instruments was observed to be normally distributed.

The descriptive information of the categorical variables is shown in Table 2. Most of the Superstition instruments considered as part of this study was developed in either U.S.A, Europe or Australia (76%). Though exploratory factor analysis was conducted by many researchers (63%), only 19.5% of them conducted a confirmatory factor analysis.

The results of homogeneity test for effect size as seen in Table 3 was significant and indicates that reliability coefficients are from heterogeneous samples (*Conchran's Q = 1347.40, p<0.01*). An important source of heterogeneity, which is seen in meta-analysis is the variability between studies. This variability is assumed due to intermediate attributes, which vary among studies like sample characteristics, design characteristics, instrument characteristics, etc (Hunter & Schmidt, 1990; Huedo-Medina et al., 2006). Figure 2 displays the forest plot at a glance of various individual studies that were considered for the meta-analysis and the overall estimate as well.

When heterogeneity is viewed in the meta-analysis, usually the role of moderating variables on the differences in effect size estimate is examined. The present study indicated significant heterogeneity in effect size, which was also consistent with the assumption of the study. The impact of the characteristics of study on effect size was further examined.

Moderator Analysis

Meta-regression analysis was performed with transformed effect size values as high levels of heterogeneity were observed. It will help identify the characteristics of studies, which contribute towards heterogeneity. Random effects model was used. Multiple meta-regression, which included all the moderators simultaneously was performed. Wilson's (2005) macros for meta-analysis was used in SPSS for the analysis.

The macro was allowed for entering only four moderator variables at one time. Due to

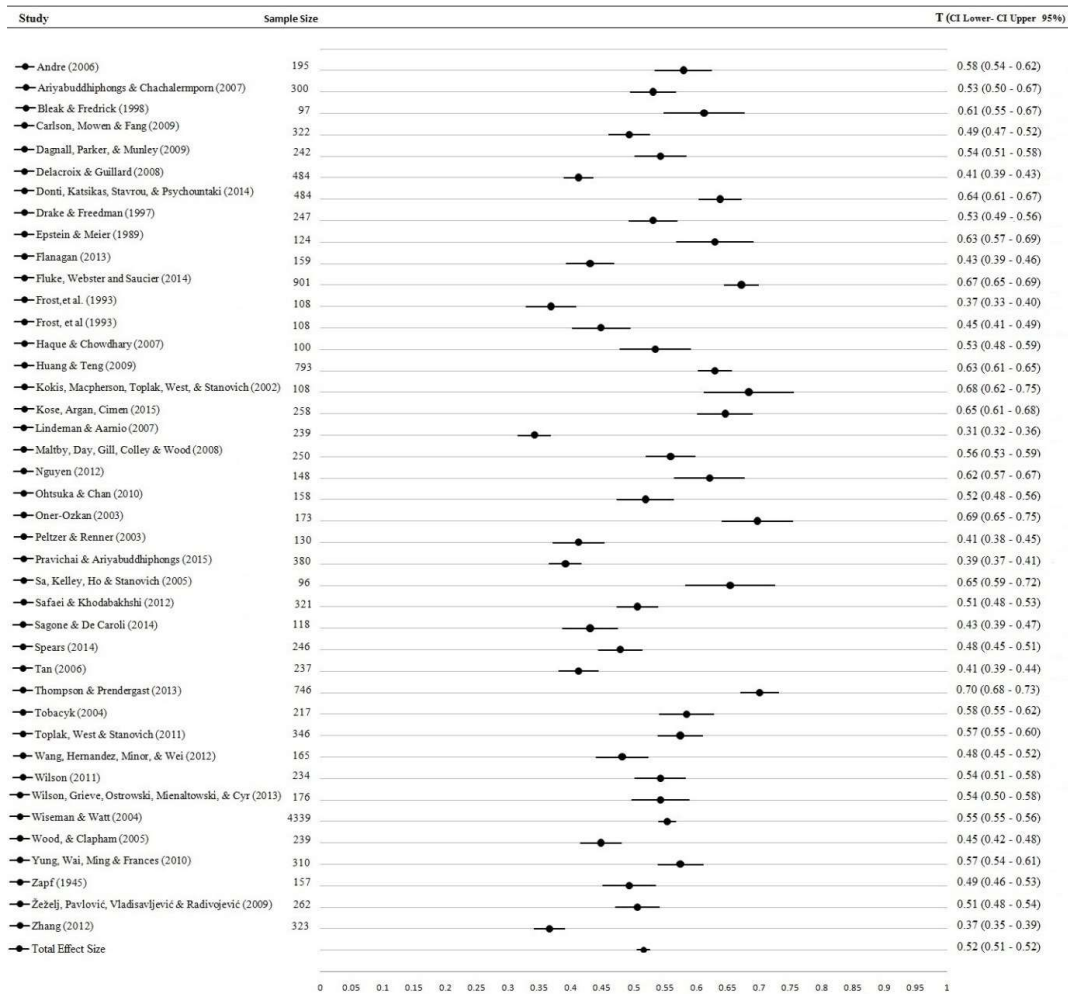


Figure 2. Forest plot demonstrating the distribution of effect size

Table 4. Meta Regression Predicting Reliability from Measurement Characteristics

Variables	B	SE	95% (CI)	p
Nature of measure	.0049	.0116	(-.0178 to .0275)	.6729
Method of data collection	-.0145	.0154	(-.0446 to .0156)	.3457
No. of items	.0006	.0006	(-.0005 to .0018)	.2833
Presence of dimensions	.0148	.0248	(-.0338 to .0634)	.5504
Reverse scoring used	.0799	.0309	(.0193 to .1405)	.0097*
Defined domain	-.1008	.0320	(-.1635 to -.0381)	.0016*
A-priori dimensions	-.0114	.0350	(-.0801 to .0572)	.7439
EFA	-.0161	.0293	(-.0735 to .0413)	.5822
CFA	.0278	.0330	(-.0369 to .0925)	.3990

Note. Adjusted R² = 39.3; *p<0.01

this restriction, the authors checked the effect through multiple iterations where each time two different variables were left out.

In the final analysis, which is presented here, the variables of the year in which the scale was developed and the number of response options for each scale were left out as they did not seem to be related to reliability. Results indicated that two of the moderators explained 36.30% of the variance ($R^2 = 36.3$, $p < .01$). It is seen that the variables of the defined domain ($\beta = -.33$, $p < .05$) and the presence of reverse scoring ($\beta = -.35$, $p < .01$) significantly predicted the reliability of instruments.

Discussion

This study has brought about some remarkable and important contributions to develop scales measuring superstitious beliefs. The results indicate that the variable of defined domain and presence of reverse coding significantly predicted the reliability of superstitious belief instruments. These findings, give important directions for future studies to focus on while developing or selecting an instrument for superstition measurement.

A review of instruments related to superstitions in the present study reveals that scales have been developed under a wide umbrella of definitions. Researchers used the terms paranormal, magical, religious and superstitious beliefs synonymously. Few of the earlier instruments considered superstitions as a category of paranormal beliefs as evident in The Paranormal Belief Scale (Tobacyk & Milford, 1983). A slightly modified version of Revised Paranormal Belief Scale used by Lindeman and Aarnio (2007) is another example. In this scale, the mean scores of all the items was used to measure overall superstition though it had items based on paranormal abilities, luck beliefs, and religious beliefs. A scale developed to measure superstition as destination attractiveness by Zhang (2012) included items based on witchcraft and ghosts to understand superstition.

On the contrary, Wiseman's Belief in Superstition Scale (2004) considers superstitions measured through paranormal belief scale as only negative superstitions. He explains two categories of superstitions namely, positive or

negative superstitions. Positive superstitions are considered more psychologically adaptive rather than maladaptive. Superstitions were also understood in terms of beliefs around luck. Lucky beliefs were a category of superstitious beliefs in Superstitious Thinking Scale (Sa, Kelley, Ho & Stanovich, 2005) and Superstitious Belief and Behaviour Scale (Kose, Argan & Cimen, 2015).

Though there is a strong association between superstitious beliefs, paranormal beliefs, and religious beliefs it becomes imperative to understand the distinction between them. We emphasise the difference given by Risen (2016) wherein superstitions are usually referred to as irrational or false beliefs which are usually referred to in the context of good or bad luck. Paranormal beliefs are referred to as a phenomenon, which cannot be explained through mainstream science. Religious beliefs also refer to a phenomenon beyond scientific explanations but, individuals who are highly religious tend to discard non-religious paranormal beliefs (Rice, 2003).

Reliability of superstition scales also did not differ based on uni-dimensionality or multidimensionality of the construct. This implies that scale development procedures can either use unidimensional or multidimensional models but, the effort can be laid on rigor in the procedure of implementing the model. Superstition scales having a single dimension were also equally reliable as scales with multiple dimensions. New superstition scales being developed can either be conceptualised as a single scale or the various facets of superstitions can be measured through different dimensions and still exhibit higher reliabilities. A multidimensional superstitious belief scale should reflect the nature of dimensions evaluated by its items.

Individual sample characteristics were found to have little impact on the reliability estimates; however, aspects of measure development characteristics like defining the domain of the construct was related to it. An exploration into the nature of items in superstitious belief scales revealed that existing popular superstitions were used as items in the questionnaire. This could be a problem to use the scale outside of its cultural context.

Reliability of scales is higher when the domain of the construct is adequately defined. Refining the construct or domain and operationalizing it is a challenging task (MacKenzie, 2003). Many superstition scales developed by various authors focus more on reporting the development of psychometric properties but, do not report important details about the initial stages of scale development. The detailed conception of the construct to be measured and understanding its theoretical background is one of the critical first steps in scale development (Miller, Reynolds, Ittenbach, Luce, Beauchamp, & Nelson, 2009).

Adequate emphasis on thinking about conceptualisation prior to writing the items increases the likelihood of developing a sound instrument. Superstitions should not be understood to include anything which people believe that cannot be explained by scientific or religious justifications. A clear description of the construct with lucidity on its borders is vital. Superstitions are culturally anchored and the nature of the construct should be conceptualised within the cultural framework. A scale on superstitious beliefs should be able to evaluate the general propensity of individuals to exhibit superstitious behaviours. The understanding of superstitions while developing a scale should typically include both positive and negative outcomes.

One of the difficult tasks in conceptualisation is differentiating the construct from other similar concepts. It is important to establish the relationship between the domain of interest and various related concepts (Miller et al., 2009). While developing scales for measuring superstitions, sufficient effort needs to be invested in understanding its scope and differentiating it from other related constructs like paranormal beliefs, magical ideation, religious beliefs etc. Many of the existing scales seem to have defined the construct but, are more loosely explained. Identifying if the construct of superstition is viewed as a belief or behaviours or attitude or a combination also becomes crucial (Furr, 2011). Thorough conceptualisation of superstitious beliefs can be done by paying adequate effort in the literature review, conducting interviews and focus group discussions. A multidisciplinary group discussion tapping the knowledge,

experience, and opinions from various experts can further enhance the conceptualisation.

Another significant finding of the present study indicates that having reverse coded items on the scale makes a difference to scale reliability. The reliability of the scales was lower when scales had items which were worded negatively. Having reverse coded items in a scale means having negative statements to measure the construct. In scale development, it is suggested to have both positive and negative statements on the scale. Having reverse coded items was considered as a solution for respondent inattention and acquiescence (Nunnally, 1978; Churchill, 1979; Anastasi, 1982; Anderson, Basilevsky, & Hum, 1983). Podsakoff, Mackenzie, Lee, and Podsakoff (2003) opined that including reverse items may act as cognitive "speed bumps". Reverse items also improve the validity of the scale (Tourangeau, Rips, & Rasinki, 2000 as cited in Weijters & Baumgartner, 2012). However, recent research evidence indicates that including reverse coded items create more problems than help.

One of the major undesirable consequences was that it reduces the internal reliability of the measure (Schriesheim, Eisenbach, & Hill, 1991; Stewart & Frye, 2004). In fact, there is a growing argument by experts against the use of reverse coded items in scales (DeVellis, 2003). The results of the present study also support this argument. Sauro and Lewis (2011) argue that response bias effect when avoiding reverse coded items is very small and hence could avoid including negative statements on the scale. Few of the existing scales incorporated negative items; however, their contribution towards reliability is not clear from literature. Researchers interested in future scale development on superstitions could consider having positive and negative superstitions as items but, can avoid reverse coded items.

The results also indicate that the number of items did not influence the reliability of superstition scales. It is viewed that internal consistency of a scale increases with the increase in number of items in a measurement instrument (Cronbach, 1951). Niemi, Carmines, and McIver (1986) viewed that adding more items

to scale will not alter its reliability as generally, we add items which usually correlate highly with existing items. Also, the increase in reliability with test length may be more relevant for very short scales but, may have minimum impact with an original long scale (Wells & Wollack, 2003). A similar observation was made by Torabi in 1988 where reliability increased as the items were increased till eighteen; however, there was only negligible change in the reliability when items were added further. Brief superstitious belief questionnaires can be developed, which still can demonstrate adequate psychometric properties. Researchers in future can avoid developing very lengthy superstitious scale as it may not increase the reliability of the scale and in turn, might lead to respondent's fatigue.

Measure design characteristics of scales were related to reliability coefficients (Peter & Churchill, 1986; Davis-Kean & Sandler, 2001). The present study results did not show any influence of the variables of the presence of dimensions, empirical examination of dimensions and confirming factor analysis to be related to reliability coefficients of superstition scales. Even though the empirical investigation of dimensions is a very important step in scale construction, if item writing in initial stages is done with sufficient rigour it might also lead to highly reliable scales. The results imply that researchers could develop measurements scales, which are either unidimensional or multidimensional but, still be highly reliable.

An important contribution of the present research was to apply meta-analytic procedures to review the literature and explore the role of various moderating variables. The present work highlights the need for the clear conceptualisation of superstitious beliefs. Future researchers can use this information to develop strong measurement instruments. The findings of the study are a result of various literatures existing in this domain, which might not be understood based on individual studies.

Strengths and Limitations

Though attempts are made at reviewing the literature on superstitions measurements, this work is a first meta-analytic study understanding the role of various variables influencing the

reliability coefficients. It also applied meta-regression analysis, which is more suitable for meta-analytic studies as compared to the general multiple regressions. The study also used the effect size transformations more relevant to the reliability coefficient rather than the Fishers z transformation used by many similar studies.

The main limitation of this study is that data for most of the variables from individual studies was not gathered since it was not reported in the articles. The study sample of forty-one studies is also small. The validity of the scales, which is also an important quality indicator was not analysed as a part of this study.

Conclusion

The major focus of the present study was to undertake a meta-analysis approach to review the literature and to understand the association between a quality indicator of the superstition scales and the various variables related to the scale. Only reliability of the scale was considered as a quality indicator and the validity of the scales was not analysed.

The study has highlighted few of the fundamental problems in superstition scales construction and one of the major observations is the inadequate reporting of psychometric properties. The findings of this study indicated heterogeneity. The role of various moderating variables and their impact on reliability estimate was explored. The defining domain is one of the critical steps in scale construction and future researchers can spend sufficient time at this stage to develop a scale with high reliability.

Reverse coding of the items or having negative statements in the scale resulted in lower reliability coefficients. Future studies in this area could explore the role of culture in designing items in a superstition scale. A meta-analytic review of superstition scales in relation to other related concepts like religiosity, paranormal beliefs, and magical ideation can be taken up.

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- Manuscript submitted on January 30, 2017
Final Revision Received on May 26, 2017
Accepted on August 8, 2017

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