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Development of an Indigenous Climate Change Knowledge Measure in Pakistan

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Abstract

Climate change is a threat to humanity and it has consequences for the physical and mental health and individuals. The knowledge of individuals about climate change determine their response to climate change. Current study aimed to develop an indigenous climate change knowledge measure in Pakistan. Development of scale process comprised of following steps: Generation of item pool, Finalization of item pool, tryout, and finalization of factor structure of the scale through exploratory factory analyses. Sample consisted of 400 young adults to finalize the scale structure and items. All ethical considerations were followed. The analyses were done through SPSS and only those items were retained in the scale who have factor loading of above .35. Two subscales were finalized on the basis of scree plot and eigenvalue more than 1. The finalized scale has two sub dimensions including nature factor and human factor. Current study provided an indigenous measure and researchers can use this self-reported to know the knowledge of individuals about climate change.

Introduction

Climate change knowledge is the perception of individuals and it leads the action of individuals and it explains how individuals would react to climate change in the given context. The knowledge about causes of climate change is considered to be the major factor that effects physical and mental health of individuals (Hidalgo & Pisano, 2010). Environmental factors and sources of information determine climate change knowledge (Salehi et al., 2016). Deeply rooted cultural factors, ideologies and historical factors also determine the knowledge about climate change (Weber, 2010). Knowledge of individuals is the key to their risk perception and judgment about an issue (Lai et al., 2012). Van der Linden (2017) suggested that knowledge about climate change is contextual and depends on formal education about climate change, exposure to climate change, and its threats to life. Researchers (Van der Linden, 2015) operationalized climate change knowledge in terms of declarative and procedural impacts. Declarative knowledge describes understanding of individuals about causes and underlying mechanisms of climate change. Impacts knowledge describes effects of climate change on individuals and infrastructure. While, procedural knowledge explores the possible solutions and responses to climate change. Universal objective self-report measures of knowledge about climate change are

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not reliable and do not provide the context specific knowledge of climate change (Howe et al., 2013). Therefore, current study aimed to explore the knowledge of adults about climate change in indigenous context. Moreover, an indigenous self-report measure of the knowledge about climate change is developed as well, that will be used in the study to assess the efficacy of CCRPM.

Methodology and Results. Item pool for the scale was based on qualitative study and literature review. The items were developed from the themes that emerged from interviews and content analyses of the interviews and literature review was used for generation of item pool. Items were finalized with the help of experts' opinion. In tryout, adults provided feedback about the vocabulary, language, and understanding of the scale statements. After successful tryout, 40 items were retained for factor structure determination. The response categories which were also finalized as five point rating scale starting with never (1), rarely (2), sometimes (3), often (4) and always (5). Exploratory factor analysis was used to explore the factor structure of the newly developed scale. The newly developed Climate Change Indigenous Knowledge Measure was used along with the demographic sheet. This scale had 40 items with five point rating scale. Sample consisted of 400 adults with an age range from 18-65 years with mean of 29.05 and SD=14.46.

Table 1

Demographic characteristics of participants (N= 400)

Demographic Characteristics	Total	
	f	%
Gender		
Men	163	40.75
Women	231	59.25
Marital Status		
Single	227	56.4
Married	173	43.6
Education		
Metric	63	15.8
Intermediate	80	20.0
Graduate	159	39.8
Post Graduate	98	24.4
Profession		
Job	27	6.8
Teaching	58	14.5
Doctor	97	24.3
Business	56	14.0
Nonworking	161	40.4
Family Monthly Income		
Up to 50000	119	29.8
51000-100000	149	37.3
101000-200000	57	14.3

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Above 200000	75	18.8
Family System		
Nuclear	216	54.0
Joint	184	46.0
Residential Area		
Planned	235	58.8
Unplanned	165	41.2
City		
Rawalpindi	168	42.6
Islamabad	75	19.0
Lahore	151	38.4

In current research large factor loading were shown on matrix which shows that it is appropriate for factoring. Only those items were selected and retained which had factor loading greater than or equal to .30 and Eigen values greater than 1 and with the help of scree plot which are main criteria for determining the number of factors to be retained during initial process of EFA. According to the criteria mentioned above scale with two factor solution using varimax rotation with 35 items of Climate Change Knowledge Scale was finalized.

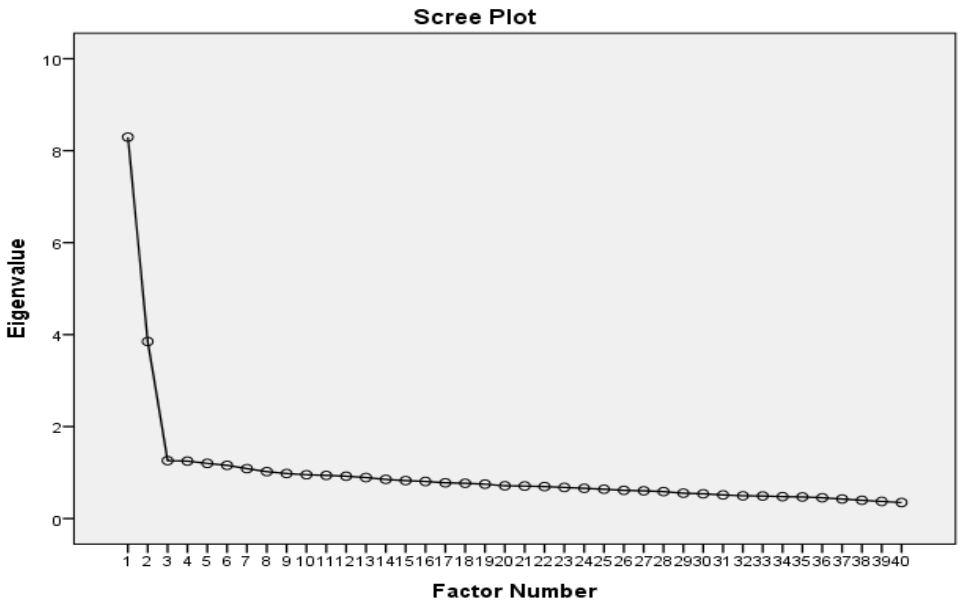

Figure 1. Scree plot (N=400)

The scree plot shows the existence of three dimensions (see figure 1) and it is also evident from figure that there are three dimensions which have the Eigen value greater than 1. On the basis of scree plot and contents of factor in each dimension three dimensions were finalized. Percentage of variance explained by two dimensions of Climate Change Knowledge Scale are 19.16 & 8.08 respectively and cumulative variance are 19.16 & 27.24 respectively.

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The factor loadings of Climate Change Knowledge Scale on the basis of greater than .35 criteria. The factor loadings ranges from lowest = .31 to highest = .62. The item no 4,5, 28,29, 31, 32 were loaded on both factors. Content validity of these items were analyzed and were also examine by SME (subject matter experts) in order to place them in one factor. Table 4 also shows that new scale has two major dimensions including Natural elements and Human elements of the climate change. The names of the two dimensions were finalized on the basis of the nature of the statements and through expert opinion. 4 other subcomponents were not retained as their items have greater loadings on the other major two dimensions too. In order to determine the psychometric properties of factors and dimensions, Cronbach's alpha and other descriptive statistics such as mean, standard deviations, and range were calculated to determine the internal consistency of the factors and dimensions. The values of Cronbach's alpha for dimensions HE and NE were .91 & .85 respectively and .90 for total Climate Change Knowledge Scale (CCKS). The actual minimum and maximum values of CCKS, HE and NE are within range. It indicated that there is no outlier or extreme scores in the data.

Discussion

Pervious researches have explored various misconceptions about knowledge and understanding of public about climate change such as climate change and ozone depletion. General public have poor understanding of climate change especially the scientific background even a layperson cannot distinguish between climate change and weather change (Reynolds et al., 2010) The present study used the self- report Likert scale for the development of climate change knowledge scale which is the most common measurement method used by modern psychologists and has been widely used for measuring attitude, knowledge and behaviors in social sciences research. It is considered as the most convenient way to measure the unobservable constructs (Cauchi et al., 2019). Most of the climate change scales have been conducted in indigenous contexts. Van Valkengoed et al. (2021) conducted a study on development and validation of climate change perception scale to assess the climate change perception and develop reliable and valid scale for climate change perception of people.

It was found that knowledge about climate change and causes were the most strongly related to attitude towards climate change. Hoppe et al. (2018) have done research on German internet users about perception of climate change how they know about and what aspect of climate change is uncertain, uninformed or misinformed results shows the highly uncertain attitude of people about climate science and how it works most of the respondents were uninformed and less correctly informed about climate change. In short, study provided a 35-item indigenous Climate Change Knowledge Measure to assess the climate change knowledge among adults in Pakistan. New scale has two major dimensions including Natural elements and Human elements of the climate change. The scale items are about the climate change phenomena, natural events that cause climate change, natural outcomes of climate change, human behavior that cause climate change, effects of climate change on humans and efforts of humans to reduce or slowing down the process of climate change.

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