Validation of Dimensionality of Affect Intensity using the Hindi Version of the Emotional Intensity Scale

Rakesh Pandey

Department of Psychology, Banaras Hindu University, Varanasi-221005, India

Prachi Saxena

Department of Psychology, Banaras Hindu University, Varanasi-221005, India

Abstract

The dimensionality of the construct of affect intensity is still a debated issue and most of the studies dealing with this debate have used the Affect Intensity Measure (AIM; Larsen & Diener, 1987) although this measure has been criticized on various psychometric grounds. We speculate that the inconsistency regarding the dimensionality of affect intensity may be either because of lack of clarity in its conceptualization or inappropriateness of its psychometric measures. In view of this, the present study attempts to explore the dimensionality of affect intensity using the Hindi version of the Emotional Intensity Scale (EIS; Bachorowski & Braaten, 1994) that claims to overcome the psychometric limitations of the AIM. The EIS-H was administered to 284 Hindi speaking Indian adults (119 males and 165 females). Exploratory factor (principal component) analysis identified two factors that were labelled as positive and negative emotional intensity. However, observation of some overlap and/or cross loading undermines the factorial purity of the EIS-H. Thus, a maximum likelihood confirmatory factor analysis was conducted to test two models - one assuming the two factors to be uncorrelated and the other as correlated. Findings revealed that the correlated two factors model provided a better fit to the data as compared to that which assumed the two factors to be uncorrelated. Findings imply that affect intensity is a multidimensional construct that encompasses two independent yet related dimensions of positive and negative affect intensity and the EIS-H may be used to reliably measure it.

Keywords: Affect intensity, Emotional intensity, Exploratory Factor analysis, Confirmatory Factor analysis, Positive affect intensity, Negative affect intensity

Individual differences in experience, expression, and regulation of emotions and their implications for health have attracted considerable attention of the researchers during the last few decades (see Pandey & Choubey, 2010 for a review). One such emotion related construct is affect intensity that represents individual differences in the experience of emotions. It has been defined as stable individual differences in the experienced strength or magnitude of emotions regardless of emotional valence i.e., positivity or negativity of emotional experience (Larsen & Diener, 1985, 1987). The basic idea behind this construct is that some individuals experience all emotions, both positive and negative, more intensely than others and the individual differences is reflected in the intensity or magnitude of emotional experience and not in the valence (Larsen & Diener, 1985, 1987). Accordingly, an individual who experiences intense positive emotions would also tend to experience intense negative emotions.

Such conceptualization of affect intensity, though, suggests that it should be considered as a unidimensional construct inasmuch as it is theorized to vary along only the intensity or magnitude of experienced emotions, empirical evidences are inconsistent regarding its dimensionality. Most of the empirical evidences however suggest that it is a multidimensional construct consisting of domains defined by arousal and emotional valence but there is still no consensus among the researchers regarding the nature and number of factors underlying affect intensity. For instance, factor analytic studies with the Affect Intensity Measure (AIM) (Larsen & Diener, 1987), one of the initial and most frequently used measures of affect intensity, have failed to converge in terms of number of factors underlying it. In an exploratory factor analysis of the AIM, Williams (1989) obtained a four-factor solution. The findings yielded two affectively positive factors, correlating positively with extraversion, and two affectively negative factors, correlating positively with neuroticism and negatively with extraversion. A model similar to that of Williams' (1989) was found by Weinfurt and associates (Weinfurt, Bryant, & Yarnold, 1994) with two positive dimensions (Positive Affectivity and Serenity) and two negative ones (Negative Intensity and Negative Reactivity). Bryant and colleagues (Bryant, Yarnold, & Grimm, 1996) examined the goodness-of-fit of five different measurement models of the AIM in order to resolve the dimensionality issue of affect intensity. They noted that the Larsen's one-factor model produced the poorest fit, whereas the Bryant et al.'s (1996) three-factor model (Positive Affectivity, Negative Intensity, Negative Reactivity) produced the best fit. Although these empirical evidences indicate that affect intensity should be considered as multidimensional construct, the lack of consensus regarding the number of factors associated with it suggests two possibilities. First, there may be uncertainty at the level of theory about what the concept should

mean and secondly, the measure(s) used to examine the structure of the construct may be psychometrically less adequate.

It is likely that the inconsistency in findings regarding the number and nature of factors underlying affect intensity may be because of vagueness at the level of theorization of the construct. For instance, if a conceptual model of affect intensity says that it is a construct that varies only in terms of intensity of experienced emotion and not in terms of emotional valence (e.g., Larsen & Diener, 1985) then any of its measure should not yield valence specific factors. This speculation regarding the uncertainty of the meaning of affect intensity becomes apparent in studies dealing with the measurement of the construct. For instance, Larsen and colleagues (Larsen & Diener, 1987; Sandvik, Diener, & Larsen, 1985) although they originally proposed the AIM as a multidimensional construct consisting of five factors (Positive Affect Intensity, Negative Affect Intensity, Preference for Arousal, General Emotional Intensity, and Visceral Reactivity to Emotional Events), later conceived it as a unidimensional measure (Larsen & Diener, 1987).

Some theoretical arguments and empirical observations also points towards the possibility that inconsistency in findings related to the dimensionality of affect intensity may be partly because of poor conceptualization of the construct (Cooper & McConville, 1989, 1993). For example, Cooper and McConville (1989, 1993) suggested that affect intensity should be viewed as a blend of trait extraversion and trait neuroticism rather than as a construct with independent psychological relevance. Taking into account the Cooper and McConville's (1989,1993) suggestion and integrating the theoretical framework of Eysenck (1967, 1981) and Gray (1981), Bachorowski and Braaten (1994) conceptualized affect intensity as a trait that varies in terms of experienced intensity of emotion vis-à-vis emotional valence. Incorporating Gray's (Gray,1981) conceptual framework of Behavioural Inhibition, Behavioural Activation, and Nonspecific Arousal Systems within Eysenck's (1967, 1981) framework of extraversion and neuroticism, they have theorized that extraverts are particularly prone to experiencing positive emotional states such as pleasure and elation because of their sensitivity to stimuli such as cues for reward. On the other hand, introverts tend to experience negative emotional states because of their sensitivity to cues such as punishment and uncertainty. They further argued that individual differences in the intensity with which the positive or negative emotions are experienced rest on the position of an individual on the dimension of neuroticism (Bachorowski & Braaten, 1994).

Based on such conceptualization of affect intensity that takes into account not only the intensity of the emotional experience but also its valence (positivity or negativity)

Bachorowski and Braaten's (1994) developed the Emotional Intensity Scale (EIS) to assess the intensity of positive and negative affective experiences. The EIS is based on a theory that assumes affect intensity as a multidimensional construct (supposed to vary on both emotional intensity and valence) as opposed to the conceptual model proposed by Larsen and Diener (1985, 1987) that views affect intensity as a unidimensional construct assumed to vary only in terms of intensity or strength of experienced emotions. Thus, the EIS appears to be an alternative to the AIM to address the issue of the dimensionality of the affect intensity inasmuch as it is based on a multidimensional theory from the start.

The inconsistency in findings regarding the dimensionality of affect intensity is also likely to be an outcome of the psychometric inadequacy of the measures used to examine its factor structure. The AIM is one of the most widely used measures to explore the dimensionality of the construct of affect intensity. However, researchers (e.g., Bachorowski & Braaten, 1994; Bryant et al., 1996; Cooper & McConville, 1993; Weinfurt et al., 1994) on several grounds have criticized the AIM as a measure of affect intensity. For example, some researchers have argued that though, AIM claims to measure the intensity of emotional experiences, examination of its content and the response format indicates that the AIM appears to measure some combination of the frequency and intensity with which people experience a variety of emotions (Bachorowski & Braaten, 1994). Thus, the score on AIM may not be considered to reflect a true measure of affect intensity rather it represents an intermingling of intensity as well as frequency of emotional experience (Bachorowski & Braaten, 1994). Others have criticized it on statistical grounds as well as at a conceptual level (Cooper & McConville, 1993). For example, Cooper and McConville (1993) contended that affect intensity construct is a statistical artifact of the affect intensity score calculation procedures and represents a blend of extraversion (positive affect) and neuroticism (negative affect).

To overcome the psychometric problems associated with the AIM, Bachorowski and Braaten (1994) developed the Emotional Intensity Scale (EIS). This scale is explicitly meant to provide a measure of affect intensity independent of the frequency of occurrence of emotions. The EIS consists of 30 items theoretically divided into two subscales - negative emotional intensity (EIS-NEG) consisting of 16 items and positive emotional intensity (EIS-POS) consisting of14 items. The initial psychometric evaluation of the EIS revealed satisfactory reliability and validity (Bachorowski & Braaten, 1994). However, some researchers have noted that "the validity evidences for the EIS is sparser than it is for the AIM" (Larsen, 2009, p. 242) and the clustering of EIS-POS and EIS-NEG is purely based on theoretical grounds and not on empirical evidence.

Such observations suggest a need to further examine the psychometric properties of the EIS and validate its proposed two factors structure. However, little has been done to examine and validate the factor structure of the EIS. An attempt to validate the anticipated factor structure of the EIS was made by Geuens and Pelsmacker (2002). The study provided evidence for the proposed two factors structure of the EIS with a 17-item reduced version of the EIS. Another study by McFatter (1998) also provided some evidence that two factors (positive and negative affect intensity) underlie the EIS. However, the study pointed out the possibility of splitting the negative affect intensity factor into two components - the frustration/anger and a non-anger component. The findings of the McFatter's (1998) study, though, suggest that EIS measures two broad dimensions of affect intensity, it also advocates further refinement of the negative affect intensity factor. Thus, the two available empirical evidences for the validity of the factor structure of the EIS fail to converge and call for collecting further empirical evidences for the validity of the proposed two-factor model of the EIS.

The foregoing review brings to the fore the possibility that the lack of consensus regarding the dimensionality of affect intensity may be a product of ambiguous conceptualization of the meaning of the construct (that is reflected in non-convergence or incongruity of theory and measurement) as well as use of less adequate psychometric measures of affect intensity. It is also evident from the preceding review that the EIS developed by Bachorowski and Braaten (1994) may be a more suitable tool to address the issue of the dimensionality of affect intensity because of two reasons. First, it has been developed to overcome various psychometric inadequacies of its predecessor, the AIM, that has been widely used to examine the dimensionality of affect intensity. Secondly, it is based on a multidimensional theoretical model of affect intensity, derived from the synthesis of personality theories of Eysenck (1967, 1981) and Gray (1981), which assumes that affect intensity may vary on both emotional intensity as well as valence. Further, the review of studies dealing with validation of the factor structure of the EIS suggests a need to reexamine its psychometric properties including its factor structure.

In light of the aforesaid observations, the present study attempts to re-examine the issue of the dimensionality of affect using the Hindi version of the original 30 item EIS. Such effort would not only help to address the issue of the dimensionality of the construct of affect intensity but would also provide empirical evidence for the validity of its specific measure i.e., the EIS. Further, the attempt to test the factor structure of a measure of affect intensity in a Hindi-speaking Indian sample would help to demonstrate the cultural fairness and linguistic independence of the EIS in

general and the construct of affect intensity in particular. Sometimes, direct translations of psychometric measures, particularly dealing with some aspects of emotions, into another language may fail to capture the meaning of the construct in another culture/language. For instance, Mearns and colleagues (2009) observed that the construct of Negative Mood Regulation expectancies is sufficiently different between Japanese and American cultures and literal translation of the American scale in Japanese may not represent the way the Japanese regulate their negative mood. Further, evaluation of the psychometric properties of self-report measures of emotional constructs (e.g., affect intensity) across different cultures becomes important in the light of the observed cultural differences in terms of affect intensity, emotion display rules and self-report of emotions (Matsumoto, 1993). Although direct empirical evidences dealing with differences in Indian and Western cultures in terms of affect intensity are scant, numerous studies demonstrate that Indians differ from individuals of other cultures in terms of other emotional aspects. For instance, Scollon, Diener, Oishi and Biswas-Diener (2004) compared emotional recall across five different cultures (European Americans, Asian Americans, Japanese, Indians and Hispanics) and found that there were cultural differences in the degree of recall of frequency of emotions and they were related to the reports of intensity of those emotions. Similarly, Elfenbein, Mandal, Anbady, Harizuka and Kumar (2002) found cultural variations in the way Indians, Americans and Japanese recognize facial emotions. American expressors were more easily understood than Indian expressors, who were more easily understood than Japanese expressors were. Cross-cultural differences have also been observed in emotional appraisal among Indian and American students. Indians, when compared to Americans, appraised events as less discrepant and showed lower sadness and anger (Roseman, Dhawan, Rettek, Naidu & Thapa, 1995).

To our best knowledge, no attempt has been made to develop the Hindi version of the EIS or other measures of affect intensity and to examine the dimensionality of the construct of affect intensity in the Indian culture. Thus, the findings of the present study would demonstrate the validity of the construct of affect intensity and its measure in the Indian cultural context in addition to paving the way for future research in the area of affect intensity by making available a Hindi version of the EIS.

Method

Participants

The study was conducted on a convenience sample of 284 Hindi speaking Indian adults (living in Varanasi, India) who volunteered for the study. The sample consisted

of 165 females and 119 males in the age range of 18 to 50 years (mean age 24.31, SD = 5.98years). Due attention was given to get a relatively heterogeneous sample in terms of age, occupation and education level in order to ensure wide variation in response so that inter-correlation among items is not artificially truncated because of restricted response variance. Accordingly, effort was made to sample participants from different occupational background including students, teachers, advocates, officers, housewives, marketing personnel, office workers, businessman as well as some unemployed individuals. The education level of the participants also varied considerably ranging from matriculation (standard X) to Ph.D. All the participants belonged to middle class socio-economic status.

Measures

The Emotional intensity scale (EIS; Bachorowski & Braaten, 1994) is a self-report measure intended to assess the usual or typical intensity with which people experience emotions. The scale consist of 30 items, 14 items measure positive emotions such as joy and liveliness, while the remaining 16 items assess an array of negative emotions, including anger and frustration. Each item is followed by five response options each reflecting different levels of emotional response intensities and the participants are required to choose one that best describes their way of experiencing emotions. The total EIS score can range from a minimum of 30 to a maximum of 150 with higher score indicating higher affect intensity. An example of an item from the original emotional intensity scale is "*I think about awful things that might happen. I feel:- I. It has little effect on me, 2. A little worried, 3. Worried, 4. Very worried, 5. So worried that I can almost think of nothing else*".

Procedure

The Hindi version of the EIS (EIS-H) was developed and administered individually or in small groups. Initially a group of three researchers in the field (having knowledge of both Hindi and English) were requested to translate the EIS into Hindi. This group was briefed about the concept of affect intensity and the purpose of the original scale and was requested to give due attention to the grammatical form as well as psychological content of each item while translating it. These three translations were evaluated by the first author and a preliminary Hindi version of the EIS was prepared. Alternate forms were kept where there was lack of consensus among translators. This preliminary Hindi version of the EIS (with alternate forms of certain items) along with the original was submitted to a panel of three experts working on this topic for evaluating the adequacy of the translation. The experts were asked to rate the appropriateness of the content for each translated item on a three point scale - 1

(not adequate at all), 2 (moderately adequate) and 3 (adequate) - and to give suggestions for improving the content of those items that received a rating of less than 3. Approximately 10% of the items were revised according to the given suggestions. The final Hindi translation of the EIS (hereafter referred to as the EIS-H) was then back translated into English by another researcher of the field. The back translation was compared with the original form by the second author and the translation was found satisfactory. The final Hindi version of the EIS was administered on a small group of 15 individuals to evaluate the subjective understanding of the item content and identify any ambiguity (if present) in instructions or meaning of the items. This pilot testing revealed no difficulty in understanding either the instruction or the item content of the EIS-H. Finally, the EIS-H was administered on the 284 participants of the present study either individually or in small groups.

First, we explored the factor structure of the EIS-H using both exploratory and factor analytic approaches followed by an evaluation of other psychometric properties of the scale such as item-total correlation, alpha-if-item deleted and internal consistency.

Results

Exploratory as well as confirmatory factor analyses were done on the data and the findings are summarized in the following two sections.

Exploratory Factor Analysis

Before factor analysing the data, the determinant of the correlation matrix, Bartlett's test of sphericity and Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) were computed to examine the adequacy of the sampled data for factor analysis. The Bartlett's test of sphericity was found significant (Chi Square (435) = 191.7, p< .000) which suggests that it is unlikely that the correlation matrix is composed of uncorrelated variables. The problem of multicolinearity was also not detected in the present data as the determinant of the correlation matrix (0.0001) was higher than .00001. The KMO measure of sampling adequacy (KMO= 0.833) was found to be higher than .8 which suggests that the correlation matrix is compact and is likely to yield distinct and reliable factors. The observation of the anti-image correlation matrix also revealed that the KMO values for individual variables were higher than .50, which further supports the adequacy of the data for factor analysis (see Gorsuch, 1983; Hutcheson & Sofroniou, 1999).

Table 1: The rotated component matrix of the EIS-H

	Components	
Item no.	1	2
25	.590	
7	.544	
19	.537	
11	.523	
9	.519	
1	.513	
3	.507	
16	.501	
4	.476	
5	.475	
30	.469	.309
22	.457	.313
17	.446	
13	.397	
15	.392	.390
21	.382	
26	.260	
6		.646
12		.642
28		.624
20		.616
2		.606
10		.571
24	.257	.535
29		.435
8		.425
14	.265	.410
18		.365
23	.278	.356
27		.291

To explore the dimensionality of the EIS-H, the obtained data was subjected to principal component analysis that identified eight components with eigen values greater than one. However, only the first two factors (explaining 27.448% of the total variance) were subsequently rotated as the EIS has originally been developed with the intent to measure two factors and the scree plot also indicated the presence of two significant factors. For the interpretation of the factors, a cut-off loading of .25 was used as per the suggestions of the Gorsuch (1983) study to use the double of the correlation coefficient found significant for a given sample size. The varimax rotated two factor solution of the EIS has been presented in Table 1.

It is evident from the Table 1 that 17 items loaded significantly on the first component and 13 on the second component. The examination of the content of the items having significant loading on the first factor revealed that all the 14 items originally proposed to measure positive affect intensity loaded significantly on it. Some example items loading on this factor include *Item 25,* My boss gives me an unexpected pat on the back and says, 'nice work'. I feel: 1. Exuberant-my day is perfect, 2. Very gratified, 3. Gratified, 4. Slightly gratified and 5. It has little effect on me. *Item1:* Someone compliments me. I feel: 1. It has little effect on me, 2. Mildly pleased, 3. Pleased, 4. Very pleased, and 5. Ecstatic, on top of the world.

However, the item 4 (I see a child suffering. 1 feel: 1. It has little effect on me, 2. A little upset, 3. Upset, 4. Very upset and 5. So extremely upset I feel sick to my stomach), item 15 (Someone I know is rude to me. I feel: I So incredibly hurt I could cry, 2. Very hurt, 3. Hurt, 4. A little hurt and 5. It has little effect on me) and item 22 (I have hurt someone's feelings. I feel: 1. It has little effect on me, 2. A little sorry, 3. Sorry, 4. Very sorry and 5. So extremely sorry I will do anything to make it up to them), which were originally proposed to measure negative emotional intensity, also loaded significantly on the first factor thereby reducing the factorial purity of the scale.

Thirteen items loaded significantly on the second factor and all of them reflected negative emotional intensity, as originally proposed by Bachorowski and Braaten (1994). Some example items from the original scale that loaded significantly on second factor are: Item 6: Something frustrates me. I feel: 1. It has little effect on me, 2. A little frustrated, 3. Frustrated, 4. Very frustrated and 5. So extremely tense and frustrated that my muscles knot up; Item 12: People do things to annoy me. I feel: I. It has little effect on me, 2. A little bothered, 3. Annoyed, 4. Very annoyed and 5. So extremely annoyed I feel like hitting them. Three items (items 14, 23 and 24) having significant loading on this factor also loaded significantly on the first factor. However, the magnitude of the factor loadings of these items were relatively lower on the first

factor (loadings ranged from .257 to .278) as compared to the second factor and the item contents (item 14: I have an embarrassing experience. I feel; item 23: I am late for work or school and I find myself in a traffic jam. I feel; item 24: I am involved in a situation in which I must do well, such as an important exam or job interview. I feel) were congruent with rest of the items defining the second factor (negative affect intensity); these items may therefore be considered as part of this factor. Thus, the second factor with 13 items, all of which represent negative emotional content, may be labled as negative affect intensity.

Overall, the findings of the exploratory factor (principal component) analysis provide partial support that the EIS-H measures two factors - the positive and negative emotional intensity. However, the observation that some items loaded on factors other than that which they belonged to (or loaded on both factors) puts a caveat on the factorial purity of the EIS-H, particularly the factorial purity of the positive affect intensity factor as it was found to be composed of both positive (14 items) and negative (3 items) affect intensity items.

In view of the lack of factorial purity of the structure of the EIS-H, we tried a varimax rotated three factor solution. However, the obtained pattern of loadings across the three factors were more difficult to interpret as compared to the aforesaid two-factor solution. The first and the third factors were found to be composed of items representing both positive and negative affect intensity whereas the second factor was composed of only negative affect intensity items.

To sum up, the findings of exploratory factor analysis do not provide full support to the factor structure of the EIS-H as proposed by Bachorowski and Braaten (1994). Thus, to validate the hypothesized factor structure of EIS-H (14 items defining positive affect intensity and 16 negative affect intensity) a confirmatory factor analysis was conducted.

Confirmatory Factor Analysis

To validate the two dimensional structure of the EIS-H as originally proposed by Bachorowski and Braaten (1994), a maximum likelihood confirmatory factor analysis was done using AMOS-16. To assess the goodness of fit of the hypothesized factor structure models the criteria used in earlier confirmatory factor analytic studies of the EIS (Geuens & Pelsmacker, 2002) were used. Geuens and Pelsmacker (2002) used the following six criteria for examining the model-fit (a) the goodness-of-fit index (GFI) greater than .80, (b) the adjusted goodness-of-fit index (AGFI) greater than .9, (c) the root-mean-square error of approximation (RMSEA) less than .08 (Cole, 1987), (d)

the ratio of maximum-likelihood chi-square to the degrees of freedom (X^2/df, Bollen, 1989) less than five, (e) Tucker and Lewis non-normed fit index (TLI) greater than .9, and (f) Bentler's comparative fit index(CFI) greater than .9. Here it is worth mentioning that although we are using the criteria of testing the model fit as used by Geuens and Pelsmacker (2002) to have parity, the recent recommendations for some of the said fit indices are slightly different. For example, now days a good fit is inferred if the GFI and AGFI are greater than .95, X^2/df< 2 and RMSEA is less than .05 (see Hooper, Coughlan, & Mullen, 2008 for details).

Table 2. Goodness-of-fit measures for the two models and the two revisions of the model-2

Measures of goodness-of-fit	Acceptable value	Model 1	Model 2	Revision 1	Revision 2
X^2 (df)		886.005 (405)	798.753 (404)	798.722 (403)	797.204 (402)
X^2/df	<5	2.118	1.977	1.844	1.793
GFI	>.8	.798	.833	.844	.848
AGFI	>.9	.718	.808	.820	.824
TLI	>.9	.669	.727	.764	.779
CFI	>.9	.691	.747	.782	.796
RMSEA	<.08	.065	.059	.055	.053

Two models were tested: one assuming that the two factors (positive and negative emotional intensity as originally proposed by Bachorowski & Braaten, 1994) are un-correlated and the other assuming them to be correlated. In the first model the items of the EIS were supposed to load on two factors (14 items on positive and 16 on negative emotional intensity) and these two factors were not allowed to correlate whereas in the second model these factors were allowed to correlate.The test of these models indicated that model-2 yielded a better fit than model-1 (see Table 2).

For the first model all the indices of goodness-of-fit were beyond the acceptable range except X^2/df ratio and RMSEA . However, the second model yielded a better fit to the data as compared to model-1 as indicated by a significant diference between the Chi square values of model-1 [X^2(405)= 886.005] and model-2 [X^2(404)=798.753] [$X^2_{difference}$ (1) = 87.252, p< .001] . Out of the six measures of

goodness-of-fit most were in the acceptable range (as per the criteria used by Geuens and Pelsmacker, 2002) except the TLI and CFI. The AGFI (.808) was, though, also not in the acceptable range, close to the acceptable value of .9. To achieve a better fit the second model was revised twice (hereafter referred as revision-1 and 2 respectively) on the basis of the modification indices. In the first revision the error terms associated with item 11 and item 13 were allowed to correlate and in the second revision the error terms associated with item 3 and 11 were also allowed to correlate. The examination of the various measures of goodness of fit (Table 2) indicated that these modifications, however, slightly improved the model fit, but the improvement in the values of the various indices were negligible [$X^2_{difference}$ (1) = 0.031, p>.05, between model-2 ($X^2(404)=798.753$) and revision-1($X^2(403)=798.722$); $X^2_{difference}$ (1)= 1.522, p>.05, between revision-1($X^2(403)=798.722$)and revision-2 ($X^2(402)=797.204$].

Overall, the findings of the confirmatory factor analyses suggest that the two-factor (positive and negative emotional intensity) model of the EIS (with the factors allowed to correlate, i.e., model-2) represents a satisfactory or adequate fit as most of the criteria of goodness of fit are met for this model (as per the criteria used by Geuens and Pelsmacker, 2002, as well as those recommended in the contemporary literature). The parameter estimates (factor loadings or the standardised regression weights) of all the items (when allowed to load on the factors to which they were assumed to belong) were found to be significant (Table 3) which provides further evidence and support for the validity of the two correlated-factor model of the EIS-H.

To obtain further evidence for the two correlated-factor structure model of the EIS-H, the product moment correlation between the scores of positive and negative affect intensity were computed that yielded a positive correlation between the two. The observation of a significant positive correlation (r = 0.505, p<.000) between the total scores of the positive and negative emotional intensity sub-scales provides further support to the validity of model-2 which assumes the two factors to be correlated.

Table 3: The parameter estimates of the model-2
of the confirmatory factor analysis

Items	Positive affect intensity	Negative affect intensity
1	.510	
3	.510	
5	.418	
7	.488	
9	.437	
11	.492	
13	.369	
16	.469	
17	.420	
19	.509	
21	.311	
25	.492	
26	.255	
30	.499	
2		.473
4		.397
6		.555
8		.393
10		.501
12		.449
14		.450
15		.509
18		.388
20		.515
22		.479
23		.410
24		.564
27		.318
28		.562
29		.411

Psychometric properties of EIS-H

The item level psychometric properties of the EIS-H were also found to be satisfactory. The corrected item total correlations were found to be statistically significant and ranged from a high of .238 to .484. Further, none of the 'alpha - if item deleted' values exceeded the overall alpha which provides further evidence of the reliability of the items of EIS-H. The Cronbach's alpha coefficient for the EIS-H was .853 which demonstrates satisfactory internal consistency of the EIS-H. The internal consistency of the positive and negative emotional intensity subscales of the EIS-H were also found to be psychometrically sound (Cronbach's alpha was found to be 0.763 and 0.808, respectively). To further ensure the reliability of items of EIS-H, the conventional item analysis was also done for the two subscales separately. None of the items were found to be psychometrically poor. The corrected item-total correlations for each subscale were found to be statistically significant and ranged from .264 to.446 for positive emotional intensity subscale and from .289 to .505 for negative emotional intensity subscale. None of the 'alpha - if item deleted' values exceeded the overall alpha which provides further evidence for the reliability of the EIS-H items.

Discussion

The findings of the present study provide support to the multidimensional nature of the construct of affect intensity and suggest that it has two related dimensions: positive and negative affect intensity. The observation of a satisfactory fit of the two-correlated factor model of the Hindi version of the EIS also extend support to the cross-cultural validity of the construct of affect intensity and its measure, the EIS. However, it is important to mention that the two observed dimensions of affect intensity (the positive and negative affect intensity), although found to be related, should be considered to represent different dimensions inasmuch as the correlation between the two domains was far from unity.

Further, the findings also suggest that affect intensity can be measured reliably in other cultures and languages inasmuch as the Hindi version of the EIS showed satisfactory psychometric properties and a factor structure theoretically congruent with the structure proposed by Bachorowski and Braaten (1994). Contrary to earlier studies (McFatter, 1998) which demonstrated that the original EIS did not fit with two-factor model as proposed by Bachorowski and Braaten (1994), the findings of confirmatory factor analysis of the current study suggest that EIS measures two dimensions (or factors) of emotional intensity, positive and negative emotional intensity. The observed two correlated factor model of the EIS-H is very similar to that

observed by Geuens and Pelsmacker (2002) and the results of the test of goodness of fit of the two correlated factor model of the EIS-H correspond well with the results obtained by Geuens and Pelsmacker (2002) except for few measures of goodness of fit (specifically the TLI and CFI values). This observation of the present study partially supports the validity of the Bachorowski and Braaten's (1994) conceptual model of affect intensity which has been based on the synthesis of the Eysenck's (1967, 1981) and Gray's (1981) theories of personality. According to this conceptual model, the dimension of extraversion (associated with Gray's behavioural activation and behavioural inhibition system) determines the valence of experienced emotions whereas the neuroticism dimension determines the intensity of experienced emotions. Accordingly, this theoretical frame of affect intensity predicts that it is a two dimensional construct that varies on the dimensions of intensity and valence of experienced emotions. Thus, the present observation of positive and negative affect intensity as two correlated factors is theoretically congruent with the Bachorowski and Braaten's (1994) two-dimensional model of affect intensity.

Further, the findings of the present study also offer evidence for the cross-cultural validity of the proposed two-factor structure of the EIS. We observed that all the 14 items of the EIS-H proposed to measure positive affect intensity and the 16 items proposed to measure negative affect intensity (Bachorowski & Braaten, 1994) loaded significantly on the respective factors in the confirmatory factor analytic model. However, the observed positive correlation between the positive and negative emotional intensity subscales and a better fit observed for the correlated factor model (the model-2) suggest that the two factors (the positive and negative emotional intensity) should be considered related with each other. The observation of two positively correlated factor model of the EIS is also congruent with the original conceptualisation of the construct of affect intensity which assumes that "people who experience their positive emotions more strongly will, overtime, generally experience their negative emotions more strongly as well" (Larsen, 2009, p. 241). However, this finding of the present study can be better interpreted by integrating the Bachorowski and Braaten's (1994) two-dimensional model of affect intensity with Larsen and Diener's (1985, 1987) model. The observation of two different yet positively related factors of positive and negative affect intensity suggests that affect intensity should be conceived as a multidimensional construct that varies on both emotional valence and intensity but variation in the intensity dimension is independent of the valence dimension of affect intensity. Accordingly, the variation in the experienced strength or intensity of emotion is observed (in the same direction, i.e., high or low intensity) irrespective of the valence (positivity and negativity) of experienced emotion. Further, the tendency to experience the extremes of both

positive and negative emotions seems independent of culture inasmuch as a similar pattern of relationship between positive and negative affect intensity has been noted in other cultures as well (see Larsen, 2009).

Conclusion

To sum up, the findings of the present study clearly indicate that affect intensity is a multidimensional construct and is composed of at least two factors: positive and negative emotional intensity. However, these two dimensions of emotional intensity should be considered related yet independent traits as the correlation between them was considerably less than one. The highly satisfactory psychometric properties of the EIS-H (observed both at item and scale level) and its theoretically congruent and highly comparable factor structure with that of the original English version suggests that affect intensity can be reliably measured in the Indian culture using a Hindi lexicon. This observation highlights that despite the reported differences in Indian and Western cultures in terms of various aspects of emotion such as perception and appraisal of emotions (Elfenbein etal., 2002; Roseman et al., 1995), emotional display rules (Matsumoto, 1993), emotional recall (Scollon et al., 2004) etc., the measurement of affect intensity is less likely to be influenced by cultural factors.

Despite the encouraging findings of the present study, there is a need to further examine and validate the two-factor model of the EIS in general and the EIS-H in particular. The re-validation of the EIS-H on other samples in future research is required inasmuch as a few measures of goodness of fit for two-factor model of the EIS-H were not found to be in the acceptable range as per the current criteria of the model fit (see Hooper et al., 2008). Further, since this was probably the first attempt to validate the factor structure of affect intensity using Hindi lexicon, future replication studies are required to establish the stability of the factor structure of the construct and measure of affect intensity among Hindi speaking Indians.

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References

Bachorowski, J., & Braaten, E. B. (1994). Emotional intensity: Measurement and theoretical implications. *Personality and Individual Differences*, 17(2), 191–199. doi:10.1016/0191-8869(94)90025-6

Bollen, K. A. (1989). *Structural equations with latent variables.* New York: John Wiley& Sons.

Bryant, F. B., Yarnold, P. R., & Grimm, L. G. (1996). Toward a Measurement Model of the Affect Intensity Measure: A Three-Factor Structure. *Journal of Research in Personality*, 30(2), 223–247. doi:10.1006/jrpe.1996.0015

Cole, D. A. (1987). Utility of confirmatory factor analysis in test validation research. *Journal of Consulting and Clinical Psychology*, 55(4), 584–594. doi:10.1037/0022-006X.55.4.584

Cooper, C., & McConville, C. (1989). The factorial equivalence of state Anxiety-negative affect and state Extraversion-positive affect. *Personality and Individual Differences*, 10, 919–920. doi:10.1016/0191-8869(89)90027-5

Cooper, C., & McConville, C. (1993). Affect intensity: Factor or artifact? *Personality and Individual Differences*, 14, 135–143. doi:10.1016/0191-8869(93)90183-4

Elfenbein, H. A., Mandal, M. K., Anbady, N., Harizuka, S., & Kumar, S. (2002). Crosscultural patterns in emotion recognition: Highlighting design and analytical techniques. *Emotion (Washington, D.C.)*, 2(1), 75–84. doi:10.1037/1528-3542.2.1.75

Eysenck, H. J. (1967). The biological basis of personality. Springfield, Il.: Thomas.

Eysenck, H. J. (1981). General features of the model. In H. J. Eysenck (Ed.), *A model for personality* (pp. 1-37). New York: Springer.

Gray, J. A. (1981). A critique of Eysenck's theory of personality. In H. J. Eysenck (Ed.), A model for personality (pp. 246-276). New York: Springer.

Geuens, M., & Pelsmacker, P. D. (2002). Validity and reliability of scores on the reduced emotional intensity scale. *Educational and Psychological Measurement*, 62(2), 299–315. doi:10.1177/0013164402062002007

Gorsuch, R. L. (1983). *Factor Analysis* (2nd. Ed). Hillsdale, NJ: Erlbaum.

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, 6(1), 53–60.

Hutcheson, G., & Sofroniou, N. (1999).The multivariate social scientist. London: Sage.

Larsen, R. J. (2009). Affect intensity. *Handbook of individual differences in social behaviour* (pp. 241-254). New York: The Guilford Press.

Larsen, R. J., & Diener, E. (1985). A multitrait-multimethod examination of affect structure: Hedonic level and emotional intensity. *Personality and Individual Differences*, 6, 631–636. doi:10.1016/0191-8869(85)90013-3

Larsen, R. J., & Diener, E. (1987). Affect intensity as an individual difference characteristic: A review. *Journal of Research in Personality*, 21(1), 1–39. doi:10.1016/0092-6566(87)90023-7

Matsumoto, D. (1993). Ethnic differences in affect intensity, emotion judgments, display rule attitudes, and self-reported emotional expression in an American sample. *Motivation and Emotion*, 17(2), 107–123. doi:10.1007/BF00995188

McFatter, R. J. (1998). Emotional intensity: Some components and their relations to extraversion and neuroticism. *Personality and Individual Differences*, 24(6), 747–758. doi:10.1016/S0191-8869(97)00220-1

Mearns, J., Miyahara, E., Tresno, F., Watabe, Y., Kono, K., & Takashima, E. (2009, May). *Creating a Japanese measure of generalized expectancies for negative mood regulation.* Paper presented at the annual APS Convention, San Francisco, CA.

Pandey, R., & Choubey, A. (2010). Emotion and Health: An overview. *SIS Journal of Projective Psychology & Mental Health*, 17, 135–146.

Roseman, J. I., Dhawan, N., Rettek, S. I., Naidu, R. K., & Thapa, K. (1995). Cultural differences and cross-cultural similarities in appraisals and emotional responses. *Journal of Cross-Cultural Psychology*, 26(1), 23–48. doi:10.1177/0022022195261003

Sandvik, E., Diener, E., & Larsen, R. J. (1985). Opponent process theory and emotional response intensity. *Motivation and Emotion*, 9, 407–418. doi:10.1007/BF00992209

Scollon, C. N., Diener, E., Oishi, S., & Biswas-Diener, R. (2004). Emotions across cultures and methods. *Journal of Cross-Cultural Psychology*, 35, 304–326. doi:10.1177/0022022104264124

Weinfurt, K. P., Bryant, F. B., & Yarnold, P. R. (1994). The factor structure of the Affect Intensity Measure: In search of a measurement model. *Journal of Research in Personality*, 28, 314–331. doi:10.1006/jrpe.1994.1023

Williams, D. G. (1989). Neuroticism and extraversion in different factors of the affect intensity measure. *Personality and Individual Differences*, 10, 1095–1100. doi:10.1016/0191-8869(89)90261-4

About the authors

Dr. Rakesh Pandey is presently professor at the Department of Psychology, Banaras Hindu University, India. His current research is focused on exploring the link of emotion and health and includes such topics as alexithymia, emotional intelligence, emotion regulation, and emotion related difficulties and deficits in health and well-being. He is also working on an ongoing UGC funded project on hemispheric asymmetry in depression. E-mail: rpan_in@yahoo.com, rpandeybhu@gmail.com

Prachi Saxena is currently perusing her Ph.D. research in department of Psychology, Banaras Hindu University. Her work is centered on role of emotional deficits in substance abuse – mental illness relationship. E-mail: prachisaxena.bhu@gmail.com