Reliability and Validity of Arabic Translation of the Impact of Event Scale-Revised for COVID-19 Pandemic

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General Note

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ABSTRACT

Objective: This study aims to translate and validate the Impact of Event Scale-Revised (IES-R) into the Arabic language with a population of medical students at two different universities in Saudi Arabia. *Method:* Fifty-six male and female medical students were

tested during different periods of quarantine due to the COVID-19 pandemic using both original and translated versions of the IES-R. *Results*: The Arabic IES-R has acceptable internal consistency, with the following alpha coefficients: Intrusion (Cronbach's α= 0.85), Avoidance (Cronbach's α= 0.75), Hyperarousal (Cronbach's α= 0.74), and total IES-R score (Cronbach's α= 0.88), all of which were significant (p-value< 0.01). The test-retest reliability of the Arabic scale examined with the same sample is high, with correlation coefficients ranging from 0.75 to 0.81 (p-value< 0.01) for the three subscales and total score. The reliability-parallel form method of the Arabic IES-R with the original IES-R indicates excellent consistency between the two scales, with significant (p-value< 0.01) intra-class correlation ranging from 0.80 to 0.89 for its three subclasses and total score. Finally, a principal components analysis using Varimax rotation was performed with the 3-factor forced solution explains 50.5% of the variance and generated an intrusion factor (items 1,3,6,9,14,15), avoidance factor (items 5,8,11,17,22), and hyperarousal factor (items 2,4,10,12,16,18,19). *Conclusion*: The Arabic IES-R has proven to be a reliable and valid measure for posttraumatic stress symptoms in our sample of medical students in quarantine during the COVID-19 pandemic. Category: Psychiatry, psychometry, community.

Keyword: Stress event, COVID19, hyperarousal, trauma, distress

1. INTRODUCTION

Posttraumatic stress disorder (PTSD) first appeared in the world's psychiatric terminology in 1978 (WHO, 1978). At the time, the WHO issued the ICD-9 highlighting cross-cultural recognition of the normal symptomatic response to traumatic life events (Horowitz et al., 1979, Weiss, 2007). Distinctive signs of this disorder are the upsetting oscillation between intrusion and avoidance. Characteristics of intrusion include unsought visualization of the trauma or its aftermath when awake, nightmares, self-conceptions, and sequelae. Efforts to forget the traumatic event, avoiding talking about the event, and avoiding reminders of the event are typical indicators of avoidance. More indicators are efforts to forget memories of an occurrence and its aftermath. Victims often accomplish this by overworking or abusing drugs and alcohol, among many other ways of diverting attention. Sometimes victims overwork to exhaust themselves in order to remain temporarily unaffected by the traumatic occurrence. Apart from blunt avoidance, emotional numbing often follows exposure to traumatic life occurrences. However, Horowitz presents emotional numbing as a rare indicator. While the original Impact of Event Scale remains useful, complete evaluation of responses to traumatic life happenings requires follow-up. Follow-up sessions maximize the reliability and validity of responses in the field of hyperarousal signs. An example of a contested IES is the data from the Loma Prieta earthquake (Weiss et al., 1995). Data from the responses of the emergency service teams was developed, piloted, and applied to a set of seven more items. Six intercepted a domain of hyperarousal as one paralleled the DSM-III-R and DSM-IV diagnostic methodology for posttraumatic stress disorder.

The criteria was interspersed among the seven items with the existing seven intrusion and eight avoidance items from the first IES. A random-numbered table was applied to determine placement. IES-R involved these twenty-two items. An initial presentation can be found in the 1st edition of the work in (Zatzick et al., 1997).

In formulating the IES-R, it was important to retain its compatibility with measures from the first edition. Therefore, instruction reference for scaling symptomatic reference was one week, as before. Similarly, the initial scaling scheme for frequency was retained: 0= Not at All; 1= Rarely; 3= Sometimes; and 5=Often. One change was made to one of the original items: "I had trouble falling asleep or staying asleep." This item was split into two items: "I had trouble staying asleep" and "I had trouble falling asleep." The first item had a slightly higher correlation with the remaining trauma index originally assigned to represent the item in the traumatic subscale. The other item was given a new hyperarousal subscale; it exhibited higher correlation with the other hyperarousal items. Furthermore, the item did not only have a lower correlation with the intrusion items, it also linked more with hyperarousal than with intrusion. The new six items in the hyperarousal subscale focused on (i) hypervigilance, (ii) nervous and overstated response, (iii) irritability and anger, (iv) concentration difficulty, (v) arousal from exposure to reflections, and (vi) the dissociative characteristic of re-experiencing the events stored in the memory. Weiss (2004) gives an overview of the three strong subscales, a correlation of the item-total pattern, the association of the interitem correlation, and the reliable stability of test-retest.

Experience with the data and unreliability of frequency as a sole summary indicator for self-report forced the IES-R to adopt a measure with modified characteristics. The original marker overstated the responses of "Sometimes" and "Often" in the scoring scheme. As a result, the following modifications were applied to the new scoring scheme: (i) Respondents were not directed to give the frequency of their symptoms over the previous seven days. Instead, they had to give degrees of distress of the symptom over the same period.(ii) The new response format adopted a uniform-interval 0-4 scale: 0=Not at All; 1= A little bit; 2= Moderately; 3= Quite a bit; and 4= Extremely. The original scale was comprised of varying intervals. (iii) The subscale scoring adopted the mean of the responses as opposed to the response summation applied in the original scale. This approach allowed users to instantly learn

the degree of the symptoms by simply evaluating the scores of the subscale. The subscale made this evaluation easier by presenting the scores in the same metric as the responses on the items. This was lacking in the first edition's scale. These modifications to the IES-R paralleled the format of the SCL-90-R, enabling direct comparison of approval of symptom levels across the two tools (Derogatis, 1994).

For different justifications, measures that have enabled the growing cross-cultural literature in traumatic stress and posttraumatic stress disorder were originally done in English, including the IES-R. As a result, translation enables their use with non-English native samples. Among the main objectives of this research project is ensuring the reliability and validity of the instruments used to measure the construct under study. Therefore, it is necessary to review some of the issues involved in the translation process. Mallinckrodt and Wang present a comprehensive and detailed review of the most relevant elements including some recommendations (Mallinckrodt & Wang, 2004). For example, it is important to understand the difference between a literal translation and adaptation of items from one language to another. The authors argue that adapting items from one language to another may misrepresent the results, therefore compromising the research's reliability and validity. Mallinckrodt and Wang (2004) explain Hulin's position by presenting an item that is adapted from the original scale to a second version in which two people with the same level of the construct under evaluation have the same chances of giving the same response to the same item in different languages (Mallinckrodt & Wang, 2004).

To show cross-cultural validity, Flaherty et al. (1988) recommend five levels of equivalence for adapted versions: (i) content equivalence; (ii) semantic equivalence; (iii) technical equivalence; (iv) criterion equivalence; and (v) conceptual equivalence (Flaherty et al., 1988). Content equivalence ensures the relevance and appropriateness of the content domain for the two cultures. Semantic equivalence ensures that items of the new measure convey the same message as their parallel items on the first scale. Technical equivalence addresses whether the method of gathering the data brings out comparable results from each of the cultures. Criterion equivalence shows evidence of the comparisons within the cultural norms. Conceptual equivalence looks at the similarity of meanings in each culture. To realize subsequent levels of ordered equivalence, there must be equivalence in all preceding levels.

The clarity and efficiency of the IES-R has enabled scholars from different nations and cultures to generate non-English editions. Studies show that the work achieved for the international versions are close to the recommendations of (Mallinckrodt & Wang, 2004) at different levels. Nonetheless, whether the authors' suggestions can generate better editions in terms of reliability and validity remains an empirical question. There is evidence that official translation enables investigation of a different question. The original version has been adapted to Chinese (Wu & Chan, 2004), French (Brunet et al., 2003), German (Maercker & Schützwohl, 1998), Japanese (Asukai et al., 2002), and Spanish (Báguena et al., 2001). A study drawing comparison between refugees and non-refugees also describes the Bosnian version of IES-R (Hunt & Gakenyi, 2005).

It is necessary to measure the impact of various occurrences in societies that are compatible without language and culture to increase accuracy whenever applied in the community. However, the Arabic language does not have any validated version adhering to Mallinckrodt and Wang's protocol (Mallinckrodt & Wang, 2004).

The present study was conducted to generate a validated Arabic version of the IES-R that is easier and more compatible for use in our society, language, and culture.

2. METHODOLOGY

Study setting

The study took place among a randomly selected sample of medical students from different levels at Taif and Qassim Universities from April 12, 2020 to May 24, 2020. Medical students are suitable for this study because of their bilingual abilities. There were two translation groups, each with two participants (an assistant professor of linguistics and an expert psychiatrist). Each of the translators is bilingual and has experience with both American and Arabic cultures.

The first team independently translated the original scale (the English scale) to the Arabic language. The members of each team sat together to discuss various scales before re-validating an Arabic scale. The scales were distributed to the same sample of students in two sittings, two weeks apart.

The second team then independently translated the Arabic version to a new English version following the same procedure as the first group. Again, the original English scale and the new version will be distributed to the same sample of students.

Validity was attested by four sitting on the scale and subscale (each item) level and matched the responses. The study focused on quarantine and the outbreak of the Coronavirus pandemic as the event of examination for psychological impact. The students accessed the scales sent to them through electronic Google documents.

After sending the scales to the study participants, researchers conducted a longitudinal follow-up to the students to ask them to give their university numbers. This was a mandatory requirement for enrollment in the study.

Study population

The study involved bilingual (English/Arabic) medical students at Taif and Qassim Universities aged between 18 and 60 years old. The participant sample includes both male and female students who were recruited and selected based on their willingness to participate in the study upon qualifying according to a set of inclusion criteria. Participants were asked to provide their national identification documents to verify their ages. Students below 18 years and those above 60 years of age were excluded from the study. Researchers administered basic English and Arabic tests to test the students' language abilities. Students who underperformed in either of the tests were automatically disqualified from proceeding with the study. Qualified participants were then asked to provide their medical records so that those with a history of mental illness did not take part in the study.

Study design, sampling technique and sample size

Researchers sent random questionnaires to medical students in the two universities. The study proceeded with the number of students that responded to the first sitting: 56 students total (31 male and 25 female) (see Figure 1).
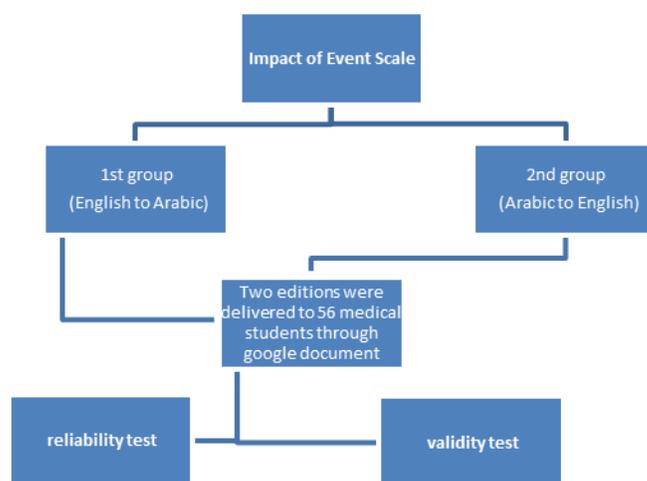

Figure 1: Flow chart of study design

Factor analysis

Exploratory factor analysis was used to explore the interrelationships among the 22 variables. Principal component analysis using Varimax rotation extracting three factors was used, and an initial eigenvalue of one or more was retained for further investigation (Pett et al., 2003).

Test-retest reliability

To consistently assess the ability of the questionnaire to measure intrusion, avoidance, hyperarousal, and total IES-R score over time, the questionnaire was administered twice, with a period of 2 weeks between each sitting. To determine test-retest reliability, a paired t test analysis was conducted to compare mean scores at the first sitting (T1) and second sitting (T2). Pearson correlation coefficients between test scores at T1 and T2 were calculated, and a two-way random effect model with consistency intra-class correlation (ICC) was calculated (Weir, 2005). ICC values can be interpreted as follows: >0.75 was excellent, between 0.40 and 0.75 was fair to good, and <0.40 was poor (Fleiss, 1999). The original English subscales were administrated after the administration of the Arabic version of the IES-R to compare means using paired sample t tests. Next, we conducted Pearson correlations to assess the reliability of the three subscales and the total score.

Ethical considerations

The researchers obtained ethical approval from the Deanship of Scientific Research at Qassim University before launching the study. They also explained the purpose of the study to the participants before obtaining formal approval from each one of them. Participation in the study was voluntary and the anonymity and confidentiality of the participants' responses was assured before

they began filling out the questionnaires. The researchers then encrypted the obtained data on their laptops with protected passwords.

3. RESULTS

Descriptive results

Of the 150 randomly selected medical students from two different universities, 56 (37.3%) students completed the Arabic IES-R twice, with a period of 2 weeks between each sitting. 31 (55.4%) were male and 25 (44.6%) were female. The mean age of the 56 participants was 21.46 ±1.695 years. Table 1 shows the demographic characteristics of the sample.

Table 1: Demographic Characteristics of the Participants (n=56)			
	No (%)	Mean	SD
Age		21.46	1.695
Gender			
Male	31 (55.4%)		
Female	25 (44.6%)		
Impact of Event Scale-Revised			
Intrusion		7.84	6.315
Avoidance		10.46	5.762
Hyperarousal		5.70	4.327
Total score		24	13.377

Internal consistency

Data from the first phase of the study were used to estimate Pearson correlations among the three subscales and the total score. The result score was high and was significant at the 0.01 level (Table 2). Internal consistency coefficient alphas were used to estimate internal consistency. The results of these analyses suggest good internal consistency according to the following coefficients: intrusion (Cronbach's α= 0.85), avoidance (Cronbach's α= 0.75), and hyperarousal (Cronbach's α= 0.74), and total IES-R score (Cronbach's α= 0.88).

Table 2: Pearson Correlations between the Subscales and Total Score			
	Intrusion	Avoidance	Hyperarousal
Intrusion	--	--	--
Avoidance	.43	--	--
Hyperarousal	.70	.36	--
Total Score	.88	.75	.81
All correlation is significant at the 0.01 level (2-tailed)			

Factor analysis

An IES-R comprising 22 items was subjected to a principal components analysis (PCA). Prior to performing the PCA, the data was assessed to determine its suitability for factor analysis. Inspection of the correlation matrix revealed many coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value was .698, exceeding the recommended value of 0.6 (Kaiser, 1974 & Kaiser, 1970), and the Barlett's Test of Sphericity (Bartlett, 1954) reached statistical significance (0.0005), supporting the factor ability of the correlation matrix. (PCA) revealed the presence of seven components with eigenvalues exceeding 1, explaining 73.7% of the total variance explained by these seven components. The screen plot comprised a large first factor (eigenvalue = 6.6), followed by two other factors (eigenvalues = 2.8 and 1.7) and 19 smaller factors. Following the theoretical structure of the IES-R proposed by Weiss and Marmar, three factors were extracted (1). A PCA using Varimax rotation was then performed with the 3-factor forced solution. Factor loadings of 0.50 were regarded significant. The solution, which explained 50.5% of the variance, generated an intrusion factor (items 1,3,6,9,14,15) an avoidance factor (items 5,8,11,17,22), and a hyperarousal factor (items 2,4,10,12,16,18,19) (Table 3). Items 7,13,20,21 had a factor load with <0.5 for all of the three factors.

Table 3: Principal Components Analysis (Varimax Rotation) of the Arabic Translation of the Impact of Event Scale

Original Factors and Items	Intrusion	Hyperarousal	Avoidance
Intrusion			
1	.674*	.248	.267
2	.358	.508*	-.390
3	.871*	-.098	.035
6	.772*	.332	.018
9	.694*	.465	.078
14	.678*	.119	.207
16	.342	.643*	.290
20	.212	.334	.028
Avoidance			
5	.337	.263	.526*
7	.298	.102	.034
8	.157	-.130	.666*
11	.061	.138	.814*
12	.132	.602*	.351
13	.284	.228	.142
17	.137	.309	.621*
22	.059	-.060	.778*
Hyperarousal			
4	.370	.541*	.133
10	.245	.756*	-.066
15	.514*	.473	-.363
18	.255	.702*	-.090
19	-.136	.688*	.138
21	.395	.159	.267
Eigenvalue	6.59	2.83	1.696
Total variance explained (%)	29.957%	12.893%	7.7%
* Items that have a factor loading > 0.50			

Test–retest reliability of the final questionnaire

Results for the test–retest reliability are shown in Table 4. Intra-class correlation is 0.885 for Intrusion, 0.846 for Avoidance, 0.873 for Hyperarousal, and 0.886 for the total score, indicating excellent consistency between the two sittings (2). Inter-item correlations were statistically significant ($p < 0.05$) between the two sittings. The paired t test analysis showed that the mean score is not statistically significant for the subscales and the total score (see Figure 2).

Table 4: Mean and Standard Deviations, Pearson's Correlation Coefficients, and Intra-class Correlation for the Scores of Each Scale at T1 and T2 (n = 56)

Factors	Mean Scores (mean + SD)		P-value[a]	Correlation Coefficient	Intra-class Correlation (ICC)	
	1st Sitting	2nd Sitting			ICC	P-value
Intrusion	7.8 ± 6.3	7.78 ± 6.35	0.922	.794[b]	0.885	< 0.001
Avoidance	10.46 ±5.76	9.8 ±6.89	0.318	.745[b]	0.846	< 0.001
Hyperarousal	5.7 ±4.3	6.1 ±4.7	0.339	.777[b]	0.873	< 0.001
Total Score	23.7 ±13.3	23.7 ±15.8	0.821	.806[b]	0.886	< 0.001

a The statistical test used is Paired t test

b The correlations are significant at P < 0.05
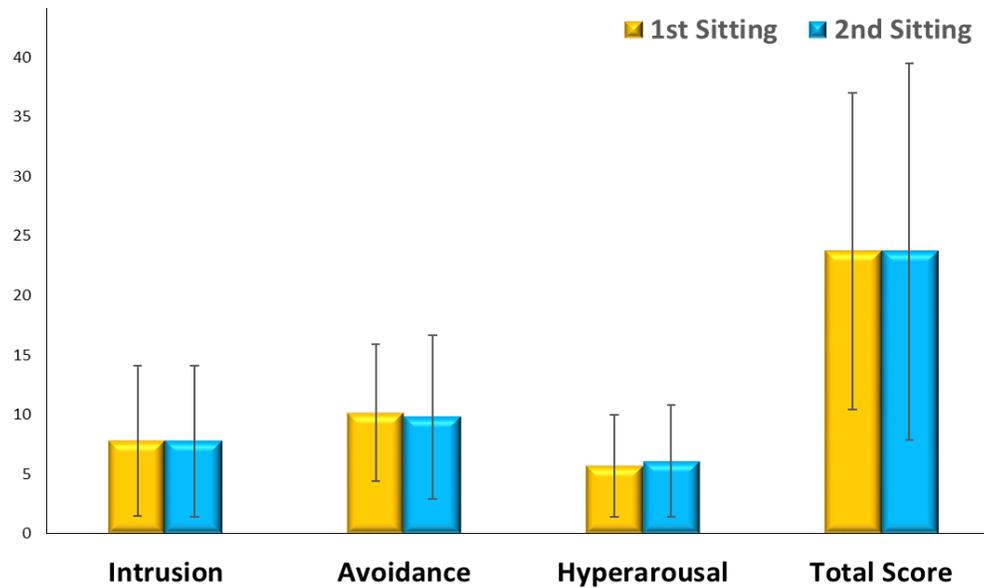
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Figure 2: Bar-chart for comparison between 1st Sitting and 2nd Sitting
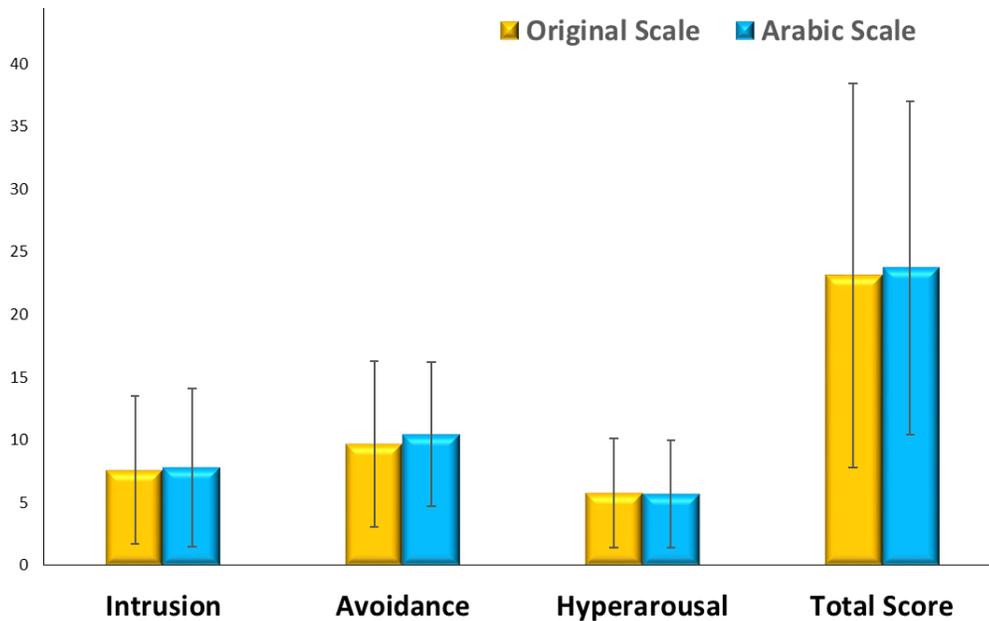

Figure 3: Bar-chart for comparison between Original Scale and Arabic Scale

Reliability of the Arabic IES-R compared to the original IES-R

The original English subscales were administrated two weeks after the administration of the Arabic version of the IES-R. We then conducted Pearson correlations to assess the reliability of the three subscales and the total score. Results shown in Table 5 indicate that the pair of avoidance scales, intrusion, avoidance scales, and hyperarousal were not significantly different compared to the first testing. Next, we conducted Pearson correlations to assess reliability. Intra-class correlation results were 0.89 for intrusion, 0.80 for avoidance, 0.87 for hyperarousal, and 0.89 for the total score, indicating excellent consistency between the two scales.

Table 5: Mean and Standard Deviations, Pearson's Correlation Coefficients, and Intra-class Correlation for the Scores of Each Scale Original Scale and Arabic T1 Scale (n = 56)

Factors	Mean Scores (mean + SD)		P-value[a]	Correlation Coefficient	Intra-class Correlation (ICC)	
	Original Scale	Arabic Scale (T1)			ICC	P-value
Intrusion	7.6 ± 5.9	7.8 ± 6.3	0.708	.798[b]	.887	< 0.001
Avoidance	9.66 ±6.6	10.46 ±5.76	0.243	.669[b]	.797	< 0.001
Hyperarousal	5.8 ±4.36	5.7 ±4.3	0.720	.767[b]	.868	< 0.001
Total Score	23.1 ±15.3	23.7 ±13.3	0.483	.809[b]	.890	< 0.001
a The statistical test used is Paired t test						
b The correlations are significant at P < 0.01						

4. DISCUSSION

This study assessed the validity and reliability of an Arabic translation of the IES-R in a sample of medical students exposed to quarantine during the COVID-19 pandemic.

The alpha coefficients of the Arabic IES-R show good internal consistency. Our coefficient alphas range from 0.74 to 0.88, comparable with the findings of Weiss & Marmar (1997) for the original English version of the IES-R and with Panaghi et al., (2006) for the Persian version of the scale.

Our results show seven components with eigenvalues above 1, explaining 73.7% of the total variance contributed by these seven components. The screen plot comprised a large first factor (eigenvalue = 6.6), followed by two other factors (eigenvalues = 2.8 and 1.7) and 19 smaller factors. Following the theoretical structure of the IES-R proposed by Weiss and Marmar, we chose to report a 3-factor solution, explaining 50.5% of the variance. Panaghi et al., (2006) reported a 3-factor solution which explained 41.6% of the variance. Davey et al., (2015) reported a 3-factor solution which explained 53.8% of the variance for the Arabic version among Middle Eastern participants living in Australia from a refugee background.

Certain studies on the psychometric features of the scale have recorded various factor structures. For instance, Weiss & Marmar, (1997) found a 1-factor solution that explained 49% of the variance. Conversely, Maercker & Schützwohl, (1998) reported a 4-factor solution (intrusion, avoidance, hyperarousal, and avoidance and numbing), which explained 63.8% of the variance.

Items 7,13,20, and 21 have a factor load of <0.5 on all of the three factors, that is, there was no load on any of the three factors. Compared with the theoretical eight intrusion, eight avoidance, and six hyperarousal items, the PCA performed in this study resulted in six intrusion, five avoidance, and seven hyperarousal symptoms. This could be due to the fact that these items were not highly reported by students in this study.

Test-retest reliability indicates excellent consistency between the two sittings and inter-item correlations are statistically significant (p < 0.05) between the two sittings. Intra-class correlation is 0.885 for intrusion, 0.846 for avoidance, 0.873 for hyperarousal and 0.886 for the total score. The original English subscales administrated at the same time of the retest administration of the Arabic version of IES-R show Pearson correlations to assess reliability of the three subscales and the total score: intra-class correlation results are 0.93 for intrusion, 0.95 for avoidance, 0.94 for hyperarousal and 0.96 for the total score. The initial publication of the Chinese version reported these data: r = 0.74 for intrusion, r = 0.52 for avoidance, and r= 0.76 for hyperarousal(Wu & Chan, 2004). The French translation reported r = 0.73 for the intrusion subscale, r = 0.77 for the avoidance subscale, and r = 0.71 for the hyperarousal subscale (Brunet et al., 2003). The data collected for the Japanese version and first Arabic version did not examine stability in as differentiated an approach as the other versions did (Asukai et al., 2002, Davey et al., 2015).

In conclusion, the Arabic IES-R has proven to be a reliable measure for posttraumatic stress symptoms in our sample of medical students exposed to quarantine during the COVID-19 pandemic.

Given the popularity of the IES and due to the large number of Arabic dialects existing in middle eastern countries with different backgrounds, the translation and validation of the IES-R into Arabic with controls for translation errors and consistency across all interviews fills an important gap in our ability to assess PTSD symptoms among Arabic-speaking populations.

The scale was tested during the COVID-19 pandemic, a major event that was clinically expected to have an impact on populations. The emerging symptoms of PTSD we noted demonstrate the need for an Arabic version of IES-R that is compatible with

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our language and culture. We welcome further researchers to use it when assessing the impact of events on the lives of Arabic speakers.

Limitations

This study requires an available sample of bilingual participants who identify with the target culture. This study relied on medical students were they should be screened with infallible screening tool to ensure a high level of bilingual fluency. Further investigation of the relationship between the Arabic IES-R and other specific measurements of PTSD is needed to examine the specificity of the Arabic IES-R for screening PTSD in the future.

5. CONCLUSION

The Arabic IES-R has proven to be a reliable and valid measure for posttraumatic stress symptoms in our sample of medical students in quarantine during the COVID-19 pandemic.

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Contribution of Authors

Concept and designs was performed by HA, literature search and data analysis was done by AA, manuscript editing and review was done by SA.

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Conflict of Interest

Authors have no conflict of interests, and the work was not supported or funded by any drug company.

Informed Consent

A consent was taken prior to participants' enrollment.

Ethical Approval

Cleared by the ethical committee of Department of Psychiatry, College of Medicine, Qassim University, K.S.A. with number 19-12-09 at Monday, May 18, 2020.

Data and Material Availability

The data are ready to be available once requested by the editors and readers.

Abbreviation list

DSM: The Diagnostic and Statistical Manual of Mental Disorders
ICC: Intra-class correlation
ICD-9: International classification of diseases, 9th edition
PTSD: Posttraumatic stress disorder
SCL-90-R: Symptom Checklist-90-R
SD: Standard deviation
T1: First sitting test
T2: Second sitting test
WHO: World health organization

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