

Construction of a New Scale for Biological Estimation of Public Speaking Stress

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Abstract

Stress is a psychophysiological phenomenon that is needed to be quantified from biological aspect for further studies and clinical applications .The objectives of the current study was to construct a valid and reliable scale for providing a quantitative estimate of the public speaking stress among academic staff .A methodological design was applied to achieve the objectives of the study.The study was conducted at the University of Kufa in the city of Najaf. A purposive sample of 200 academic staff was used the present study. A scale of 17 items for public speaking stress have been generated . Content validity was quantified throughout the measurement of the following values : item content validity index (I-CVI) and scale content validity index average (S-CVI/Ave) and content validity ratio (CVR). Two forms of reliability have been used in the current study : stability (test-retest reliability) and internal consistency . The result of the study revealed that the majority of items have been accepted ($I-CVI \geq 0.8$) and the average of all items is accepted ($S-CVI/Ave = 0.88$). All items have shown acceptable level of reliability between test and retest of the sample ($r=0.99$). Test of internal consistency (Cronbach's Alpha reliability) for the overall public speaking stress scale (PSSS) is acceptable (> 0.7). It was concluded that the suggested public speaking stress scale can be accepted as a valid and reliable scale for quantification of public speaking stress phenomenon.

Keywords : Scale , Public Speaking, Stress. Validity , Reliability

Introduction

Psychosocial stress is a well-investigated phenomenon that comes across different social situations; one of most stressfull situations is public speaking ⁽¹⁾ . Public speaking is speaking in front of an audience in order to affect them ; whivh may include the negative experience of stress while speaking and the detrimental effects on speech performance ⁽²⁾ . The source of psychosocial stress can be explained by the task of standing and speaking in front of an large strange professional audience; this situation is stressful enough to trigger wide neural and hormonal responses throughout activation of the hypothalamic pituitary adrenal axis ⁽³⁾ . The stressor elicit the activation of the

sympathetic autonomic nervous system, which promotes the release of adrenaline (epinephrine) and noradrenaline (norepinephrine) from the adrenal medulla. Secretion of adrenaline and noradrenaline leads to increase respiratory rate, heartbeat, blood concentration of glucose and the blood flow to skeletal muscles; this fast response is primarily related to survival ⁽⁴⁾ . Stress is a risk factor for several different diseases, including hypertension, inflammatory disease, cardiovascular disease, obesity, diabetes mellitus , atherosclerosis, and cancer, as well as neurodegenerative diseases ⁽⁵⁾ . Therefore, stress can influence individuals in every age, sex, race, education and situation, and can result in both physical and psychological health consequences ⁽⁶⁾ . Stress may be either external with environmental source, or caused by internal perceptions of the individual. The second form can, in turn, produce anxiety, and/or other negative emotions , thought and feelings such as press, pain, sadness which may result in depression and panic

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(7). Nowadays, Stress may be categorized as the problem of the millennium, since the recent life is mixed up with stress in all its aspects (8). Low levels of controlled stress could be desired, useful, and even healthy. Stress, in its useful form, can enhance psychosocial health and improve performance (9).

Fear of public speaking (glossophobia) may lead to communication problems with an impact on the individual's social, and emotional life (10). Many scales have been developed to measure several phenomena related to public speaking such as : anxiety and fear (11,12). However, because stress is a physiological phenomenon, we did not find any scale to measure public speaking stress (13). The new scale focuses on the biological aspects of the scale related to sympathetic and HPA axis activation, so that any signs associated with excessive fear, phobia and anxiety have been excluded.

Methodology

Subjects of the Study

The study was conducted at the University of Kufa in the city of Najaf. It was achieved by selecting a typical form of non-probability (purposive) sample. A size of sample of 200 academic staff was included in the study, which is an accepted sample size in the construction of scale (14).

Ethical Consideration

The participants were fully acquainted of the current study and its aims and then a voluntary verbal consent was obtained in order to participate in the study, besides, the confidentiality of information obtained from academic staff has been taken into account and used only for the research purpose. The protocol was approved by the ethical committee in the university of Kufa.

Study Instrument

A methodological study was used to design a scale to meet the objectives of the study. It is suggested by the teamwork including the researcher and her supervisors. This scale includes seventeen items, with three responses (0= never, 1= sometimes, 2= always).

Steps of Scale Construction

Content Validity

Content validity was quantified throughout the measurement of the following values : item content validity index (I-CVI) and scale content validity index average (S-CVI/Ave) and content validity ratio (CVR).

Item Content Validity Index (I-CVI)

Item content validity index (I- CVI) was calculated by the following equation, values above 0.79 were considered accepted (15) :

$$I - CVI = \frac{\text{No. of expert voted (strongly related and related)}}{\text{Total No. of experts}}$$

If the I- CVI is higher than 0.79, the item is acceptable; between 0.7-0.79, the item is needs revision; and in the I- CVI is less than 0.7, the item is omitted.

Scale Content Validity Index Average (S-CVI/Ave)

Scale content validity index average (S-CVI/Ave) was calculated by having the average score of the of all items' I-CVI scores (15).

Content Validity Ratio (CVR)

The following formula was used to calculate CVR, CVR value bigger than 0.49 is considered acceptable (15) :

$$CVR = (N_e - N/2) / (N/2)$$

Where :

N_e : is the number of expert determining "essential"

N ; total number of expert

Reliability

Two forms of reliability have been used in the current study : stability (test-retest reliability) and internal consistency.

Stability (Test-Retest Reliability)

Stability (test-retest reliability) has been quantified by calculating the Pearson correlation Coefficient (r) between test and retest scores of public speaking stress (15).

Internal Consistency

Internal Consistency is a measure for the

homogeneity of scale items , it has been quantified by calculating Cronbach's Alpha. Values of Cronbach's Alpha equal or above 0.7 have been considered accepted threshold for internal consistency reliability; while high quality psychological scales are preferred to have of Cronbach's Alpha between 0.8-0.9^(14, 16) .

Statistical Analysis:

Data of studied sample were entered and analyzed using the statistical package for social sciences (SPSS) version 25. Descriptive statistics presented as mean, standard deviation, frequencies and percentages. Chi-square test was used to compare frequencies. Pearson's correlation test was used to assess the correlations. Level of significance of ≤ 0.05 was considered as significant difference or correlation.

Results

The current study examined the content validity in terms of item content validity index (I-CVI) and content validity ratio (CVR) for the items of the suggested public speaking stress scale (PSSS). The findings indicated that most items have been accepted ; some items may need to be modified (items numbered 3, 6,13,15) ; and the only item that was to be deleted according to the content validity evaluation was item number 7 as it had I- CVI less than 0.7 (table 1) .

Table (2) is about test of stability (test-retest reliability and internal consistency) for the overall public speaking stress scale (PSSS), it explains an acceptable level of reliability was seen between test and retest of the sample ($r= 0.99$; p value < 0.0001) and acceptable Cronbach's Alpha score ($=0.87$) .

Table (1): Content validity in terms of item content validity index (I-CVI) and content validity ratio (CVR) for the items of the public speaking stress scale (PSSS)

Items	I-CVI	CVR	Assessment
1. On presentation day, I wish to cancel my presentation	0.88	0.75	Accepted
2. On presentation day, I have increased concern about my performance in the speech	0.94	0.88	Accepted
3. Before giving a speech, I need to drink water .	0.75	0.50	Modified
4. Giving a speech behind a platform is better for me than speaking on a stage	0.94	0.88	Accepted
5. When I begin to speak , my heart beats more rapidly and/or intensively	1.00	1.00	Accepted
6. While giving a speech , I suffer from dry mouth	0.75	0.50	Modified
7. While giving a speech , I have GIT cramps	0.69	0.38	Deleted
8. It is hard for me to concentrate in the beginning of my speech	0.94	0.88	Accepted
9. Fear from failure makes me more tense before giving a speech	1.00	1.00	Accepted
10. While giving a speech, I feel sweating	0.88	0.75	Accepted
11. During my speech, I forgot some information	0.94	0.88	Accepted
12. It is difficult for me to look at the audiences' eyes	0.94	0.88	Accepted
13. While giving a speech , my legs tremble and my posture disturb	0.75	0.50	Modified
14. While giving a speech, my voice changes (high pitch)	0.94	0.88	Accepted
15. When facing the audience, I feel difficult breathing	0.75	0.50	Modified
16. I become more confused if the audience is large and professional	1.00	1.00	Accepted
17. While giving a speech , it is difficult to use body language and voice intonation	0.94	0.88	Accepted
Overall Public Speaking Stress Scale (PSSS)	S-CVI/Ave= 0.88		Accepted

Table (2): Test of stability (test-retest reliability and internal consistency) for the overall public speaking stress scale (PSSS)

Items	Test-retest reliability	Cronbach's Alpha	Assessment
Overall Public Speaking Stress Scale (PSSS)	r = 0.99 (p value = 0.000)	0.87	Accepted

Discussion

According to table (1), the item content validity index (I-CVI) has been calculated according to the opinion of experts about the degree of relevance of each item to the concept of the phenomenon that is to be measured. Previous studies reported that I-CVI scores ranges between 0 and 1, and each item with I-CVI more than 0.79 is considered (accepted), those with I-CVI score between 0.7-0.79 need to be revised or modified, while those I-CVI level lower than 0.7 should be deleted⁽¹⁵⁾. In the current study, the majority of items have been accepted (I-CVI ≥ 0.8), it mean that experts considered these items relevant and valid to measure the stress of public speaking. The other indicator of content validity that has been used in this study is content validity ratio (CVR), in which the experts were asked to determine whether an item is essential for measuring the construct (public speaking stress) or not⁽¹⁷⁾; each item with CVR higher than 0.49 is accepted (18). According to the result of the present study, some of the items may need revision as their I-CVI is between 0.7-0.79 and their CVR is lower than 0.49; these are items numbered 3, 6, 13, and 15, while item seven has failed to reach the minimal level of I-CVI (I-CVI = 0.69) and CVR (CVR=0.38) indicated that expert did not accept it as relevant or essential to measure the public speaking stress. Through qualitative methods, items were improved until saturation was achieved⁽¹⁷⁾. One limitation of content validity is the subjectivity; the scale and its items are evaluated according to the opinions of the expert, subjecting them to bias that may be present among the experts⁽¹⁵⁾; to avoid such bias, the current study have used qualitative face validity and interrater agreement to further refine the items and the whole scale.

According to Table (3): Test of stability (test-retest reliability) for the overall public speaking stress scale (PSSS), it explains an acceptable level of reliability between test and retest of the sample (0.99). The test retest reliability, also known as the coefficient of stability, is used to assess the degree to which the participants' performance is repeatable, i.e., how consistent their sum scores are across time. Researchers vary in how they assess test– retest reliability. While some prefer to use intra class correlation coefficient, others use the Pearson product-moment correlation. In both cases, the higher the correlation, the higher the test–retest reliability, with values close to zero indicating low reliability. In addition, study conditions could change values on the construct being measured over time (as in an intervention study, for example), which could lower the test-retest reliability⁽¹⁴⁾.

Table (2) is about test of internal consistency (Cronbach's Alpha) for the overall public speaking stress scale (PSSS), it explains an acceptable level of internal consistency reliability (= 0.87) was recorded for overall public speaking stress scale (PSSS). Cronbach's alpha assesses the internal consistency of the scale items, i.e., the degree to which the set of items in the scale covary, relative to their sum score. An alpha coefficient of 0.70 has often been regarded as an acceptable threshold for reliability; however, 0.80 and 0.95 is preferred for the psychometric quality of scales. Cronbach's alpha has been the most common and seems to have received general approval⁽¹⁴⁾.

The researchers concluded that the scales of anxiety and fear of public speaking combined psychological and physiological indicators, and it talks about what happens before, during, and after the day of the speech, and our scale only talks about the day of the speech.

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Conflict of Interest : Nil

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