Abstract

Background: Excessive health anxiety can lead to significant disorders such as hypochondriasis. In children, assessment of the severity of health anxiety has been performed using the Childhood Illness Attitudes Scales (CIAS); however, no validated Arabic version of this tool exists.

Aims: This study developed and validated an Arabic version of the CIAS questionnaire in Jordan in 2017 to provide a tool to measure the severity of health anxiety in the Arabic-speaking world.

Methods: The CIAS was translated from English to Arabic then back-translated by a different translator and the 2 versions were compared before cognitive interviews were conducted. The final version of the questionnaire was circulated to 597 children. Of these, 200 were asked to retake the questionnaire after 10–15 days to evaluate test–retest reliability. Confirmatory factor analysis (CFA) on the 4-factor model suggested by the original questionnaire version was performed. Internal consistency and test–retest reliability were evaluated.

Results: The CFA showed good fit (goodness of fit index $\chi^2/df = 0.92$) with the 4-factor model of fears, help seeking, treatment experience, and symptom effects. Test–retest reliability was high and the model had good discriminant validity and internal consistency.

Conclusions: The Arabic version of the CIAS provides a suitable tool to investigate the
Introduction

Health anxiety is an experience that we undergo when we misinterpret benign bodily sensations as being indicative of having a serious disease (1). The severity of this experience differs among individuals (2). Mild, occasional health anxiety is normal as it motivates one to seek clinical assistance when experiencing ambiguous bodily changes; such sensations usually soon fade away when medical staff give reassurance that there is no serious disease (1). Being convinced of having a serious disease despite medical reassurance of having good health is a feature of excessive health anxiety. Severe health anxiety can lead to clinically significant disorders such as hypochondriasis, disease phobia (3–5) and panic attacks (5). Sometimes, severe health anxiety can interfere with daily activities such as schoolwork (6) or social activities (7). Health anxiety can also lead to overutilization of healthcare services and therefore increase healthcare costs (8). Somatization accounts for 15–20% of yearly healthcare expenditure in the United States of America (9). This includes the cost of emergency room visits, hospitalization, unnecessary diagnostic expenses, and invasive procedures (10).

The prevalence of excessive health anxiety has been assessed in several studies. Most of these studies concentrated on assessing the severity of health anxiety in adults or adolescents
Few studies have focused on children, and although some work has shown that children might experience fears related to health issues or death (13,14), the prevalence of such health anxiety conditions in children is not well understood (15,16). However, some studies estimated that the prevalence of health anxiety in primary care paediatric settings was 25–50% of visits (17) and was more common in girls (7).

Although it has been shown that frequencies of illness anxiety disorder are similar across countries and cultures (18), the prevalence of the condition in Jordan has not yet been evaluated, or its burden on the health sector. Thus, adaptation of a validated tool to measure the prevalence and burden of health anxiety is urgently required.

In order to apply treatments that are available for excessive health anxiety, an assessment of the severity and prevalence of such health anxiety conditions should be performed. Such assessment of the severity of health anxiety can be performed using questionnaires such as the Illness Attitudes Scales (IAS) (19). In previous work, assessment of the severity of health anxiety was performed in Canadian children aged 8–15 years, using the Childhood Illness Attitude Scales (CIAS), a simplified form of the IAS adapted to suit school-aged children (15,16). The CIAS measures fears, beliefs and attitudes associated with health anxiety and abnormal illness behaviour in childhood.

The aim of this study was to develop an Arabic version of the CIAS and to examine its validity in a large sample of schoolchildren aged 10–16 years in Jordan. The validated questionnaire can then be applied to different parts of the Arabic-speaking world throughout the Middle East and North Africa. This Arabic version of the CIAS will allow researchers and health authorities to examine childhood health anxiety and develop an understanding of potential solutions, in regions where this was hitherto impossible. Furthermore, given comparable psychometric properties, this Arabic version will also allow researchers to make comparisons with data collected using the original English version of the CIAS from other regions.

**Methods**

**Participants**

The original sample included 310 boys and 347 girls aged 10–16 years from 2 schools in Amman, Jordan. Of these, 60 children participated in cognitive interviews, with the remaining 597 completing the questionnaire. The mean age of the participants was 13.55 (standard deviation 2.02) years. The principals of the 2 schools were approached to obtain their approval. We circulated the parental consent form to the children with the help of teachers who agreed to participate. All children who returned a signed consent form and completed the questionnaire were included in the study. Ethical approval for the research was obtained from Al-Zaytoonah
University Research Ethics Committee.

**CIAS**

The CIAS (16) is a 35-item self-report questionnaire (Appendix 1) that was formulated based on the IAS questionnaire (19). The CIAS uses simplified words and phrases to be more suitable for children. The appropriateness and clearness of the simplified questions were confirmed in a pilot study that interviewed children and received their feedback (16). The questionnaire was validated by evaluating the correlations between CIAS total scores obtained from 200 children and other self-report measures including Fear Survey Schedule for Children-Revised (20), Childhood Anxiety Sensitivity Index (21) and Children’s Depression Inventory (22). The CIAS contains 4 factors that explore fears, help seeking, treatment experience and symptom effects, and these were confirmed by applying exploratory factor analysis (EFA) (15).

Thirty-three items of the questionnaire were rated on a 3-point Likert scale (1 = none of the time, 2 = sometimes, 3 = a lot of the time). Items 29–31 measured the frequency of various treatment experiences (1 = 0 times, 2 = 1 or 2 times, 3 = ≥3 times). Thirty-three of the 35 items were used in scoring while the remaining 2 questions were open ended and provided additional information about the patients’ medical history.

**Data collection**

The CIAS was translated from English to Arabic then back-translated by a different translator, and the 2 versions were compared. A school was approached in Amman to obtain data. Initially, 60 cognitive interviews were conducted with 60 children aged 9–16 years after obtaining their parents’ approval, and confirming that all questions were clear and could be understood by the children. The translated questionnaire is shown in Appendix 2. A parental consent form was circulated to an additional 680 children and 597 parents’ approved that their children’s participation in the study. Of the 597 children, 200 were asked to retake the questionnaire after 10–15 days.

Several methods for determining the appropriate sample size for conducting a confirmatory factor analysis (CFA) and EFA have been proposed. However, Myers et al. (23) found that data from 500 individuals provide sufficient power for 99.9% of samples. Therefore, we aimed to collect data from at least 500 participants.

**Statistical analysis**

The items were treated as ordinals and the normality of scores on each subscale of each model
was assessed by calculating kurtosis values. Normality was assumed when kurtosis was between −2 and +2 (24).

The suitability of the data for factor analysis was evaluated using the Kaiser–Meyer–Olkin value and Bartlett’s Test of Sphericity. CFA on the 4-factor model was conducted using AMOS version 22 and SPSS version 20. Item loadings were examined and goodness of fit evaluated by calculating minimum discrepancy (CMIN/DF), goodness of fit index (GFI), Tucker–Lewis index (TLI), comparative fit index (CFI) and root mean square error of approximation (RMSEA). Acceptable values are

EFA was conducted using principal-components analysis to evaluate a suitable model for the data after determining that the 4-factor model that included 33 items was unsuitable for our data. To determine the appropriate number of factors to extract, parallel analysis (Eigenvalue Monte Carlo Simulation) was conducted using O’Connor’s SPSS syntax (26), and scree plots.

A pattern matrix was generated using oblimin rotation, which was chosen because the correlation between factors 1 and 4 exceeded the cutoff point of 0.32 (r = 0.35). Any communality below 0.4 was excluded. The factor correlation matrix was evaluated to determine discriminant validity. Internal consistency for each subscale was evaluated by calculating Cronbach’s α and the final model was re-evaluated using CFA with the maximum likelihood method. Finally, test–retest reliability was measured using Pearson’s correlation.

The ceiling and floor effects were evaluated by calculating the percentage of participants that had the highest or lowest possible scores; the effect was considered present when the subjects that achieved these scores exceeded 15% (27).

Results

The Kaiser–Meyer–Olkin test result was 0.9 and Bartlett’s Test of Sphericity was significant \( \chi^2 (496) = 18\,145.56, P \) Figure 1); as four eigenvalues are present left of the “elbow” of the graph.

The 4-factor model was confirmed when conducting parallel analysis. The 4-factor model included fears, help seeking, treatment experience and symptom effects. The communalities of the items included in the 4-factor model were all > 0.4 (Table 1) and the lowest loading was 0.65 (Item 3 in the Fear subscale: Does the thought of being sick scare you? (Table 2). Cronbach’s α values were examined and the lowest was 0.85 for treatment experience.
Removing any further items would not improve the reliability. Subscale names, item numbers, factor loadings, communalities, and Cronbach’s α, means, standard deviations and kurtosis for the 4-factor model are shown in Tables 1 and 2. Cronbach’s α indicated good internal consistency. Correlations between the 4 factors were examined using Pearson correlations and all were low, which indicated good discriminant validity. The kurtosis for the 4 subscales was between −2 and 2, which indicated normality.

CFA of the suggested 4-factor model including the 31 remaining items with 5-error covariance in the same factors yielded acceptable model fit indicators (CMIN/DF = 2.58, GFI = 0.9, CFI = 0.96, TLI = 0.96 and RMSEA = 0.049). Test–retest reliability was tested by Pearson’s correlations and all the items were highly correlated (all > 0.7, with most > 0.8).

The ceiling and floor effects were evaluated by calculating the percentage of subjects that had the highest or lowest possible scores, and none of the factors exceeded the 15% cutoff point (27).

**Discussion**

This study formulated and validated an Arabic form of the CIAS Questionnaire (16). The results of the EFA resembled the original 4-factor model suggested by Wright et al. (15). These factors consist of fear of illness, death, disease and pain, and help seeking that evaluated seeking treatment and avoiding unhealthy foods, symptom effects and treatment experience that were present in the original IAS study (19). Symptom effects measure the troublesome effects of symptoms on daily activity. However, there were some differences between the Arabic version of the CIAS and the English version of Wright et al.: Items 11, 15 and 25 had loading issues in their designated factor in the study of Wright et al. and therefore were excluded from the model. We included treatment experience (Items 11 and 15) and symptom effects (Item 25) in our final model. We excluded Item 8 because of low communalities, although Wright et al. found this item loaded on the factor treatment experience, so it was removed in the final model to improve reliability. This was reasonable considering that Item 8 (Do you try not to have habits that may be bad for you?) asks about habits rather than previous experience with doctors, unlike the remaining items in this factor. Cultural differences may lie behind these differences found between our study and Wright et al., in addition to design differences including a substantially larger sample size. Furthermore, we performed cognitive interviews to ensure that the questions were clear for children. We believe that the questions were clear because we found high internal consistency and test–retest reliability.
Future work may include confirming diagnostic credibility of the Arabic version of the CIAS by evaluating the scores of children with confirmed diagnoses of health anxiety or hypochondriasis and comparing them to a control group. This could address a limitation found in this study, which is not evaluating the scores of the Arabic version of the CIAS for different health conditions.

Different studies with adults have confirmed that there are correlations between different medical conditions and health anxiety including, for example, chronic pain (28) and cardiovascular disease (29). Therefore, the Arabic version of CIAS can be used to measure health anxiety in different diseases.

Evaluating health anxiety could also be important when treating different health conditions. For example, it has been shown that patients with high health anxiety react differently to pain when compared to patients with low health anxiety (30). This is manifested in differences in pain appraisal, pain preoccupation, coping strategies, self-identity, and suicidal ideation. In addition, patients with health anxiety may fail to engage in protective strategies (31), which may have an impact on the success of management of their condition. Therefore, using the Arabic version of CIAS could help in the management of different diseases and future work may include measuring the benefit of detection and management of health anxiety when managing different conditions. As this tool can be used for screening different patients, particularly those who are reporting contradicting symptoms, this could save healthcare costs.

Finally, the Arabic version of the CIAS can be used to compare the prevalence of health-related anxiety in Arabic-speaking countries, which has hitherto not been possible. It will also now be possible to make comparisons between health-related anxiety with data collected using the English language version of the scale.

A limitation of this study was that the children enrolled were only from schools from Amman. However, Amman is the largest city in Jordan; almost half of the Jordanian population lives there (4 million inhabitants) (32), and many come from different parts of the country for work, which makes Amman a good representation of Jordan.

**Conclusion**

This validated Arabic version of the CIAS questionnaire (15) could be used to evaluate health
anxiety in children by examining the overall scores and the scores of the different subscales, which could aid in diagnosis and management of health anxiety in children across the Arabic-speaking world.

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Validation de la version arabe de l’échelle d’attitude à l’égard de la maladie chez l’enfant

Résumé

Contexte : Une anxiété excessive en matièr de santé peut entraîner des troubles importants tels que l’hypocondrie. Chez l’enfant, l’évaluation de la gravité de l’anxiété liée à la santé a été réalisée à l’aide de l’échelle d’attitude à l’égard de la maladie chez l’enfant ; cependant, aucune version arabe validée de cet outil n’existe.

Objectifs : La présente étude a mis au point et a validé une version arabe du questionnaire des échelles d’attitude à l’égard de la maladie chez l’enfant en Jordanie en 2017 afin de fournir un outil permettant de mesurer la gravité de l’anxiété liée à la santé dans le monde arabophone.

Méthodes : Le questionnaire susmentionné a été traduit de l’anglais vers l’arabe. Il a ensuite fait l’objet d’une rétro-traduction par un autre traducteur et les deux versions ont été comparées avant la réalisation des entretiens cognitifs. La version finale du questionnaire a été distribuée à 597 enfants. Parmi ceux-ci, 200 ont été invités à répondre de nouveau au questionnaire après 10 à 15 jours pour évaluer la fiabilité test-retest. Une analyse factorielle confirmatoire sur le modèle à quatre facteurs basé sur la version originale du questionnaire a été réalisée. La cohérence interne et la fidélité test-retest ont été évaluées.

Résultats : L’analyse factorielle confirmatoire a montré un bon ajustement (indice d’ajustement
Validation of the Arabic version of the Childhood Illness Attitudes Scales

= 0.92) avec le modèle à quatre facteurs des peurs, de la recherche d’aide, de l’expérience du traitement et des effets des symptômes. La fiabilité test-retest était élevée et le modèle avait une bonne validité discriminante et une bonne cohérence interne.

Conclusions : La version arabe de l’Échelle d’attitude à l’égard de la maladie chez l’enfant fournit un outil approprié pour enquêter sur la prévalence et la gravité de l’anxiété infantile au Moyen-Orient.
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