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Research article

# Coping strategies among children and adolescents: validity and reliability of the Arabic version of the Kidcope scale

Reham I. Abdelmageed [a,*], Yasmine I. Elhenawy [a], Dalia K. Zaafar [b], Asmaa W. Abdelaziz [a]

[a] Pediatrics Department, Faculty of Medicine, Ain Shams University, Cairo, Egypt
[b] Pharmacology Department, Faculty of Pharmacy, Modern University for Technology and Information, Cairo, Egypt

## HIGHLIGHTS

- The Kidcope is applied in different languages aside from Arabic.
- The Arabic version of the Kidcope is reliable and valid.
- The three and two-factor structures of the Kidcope were confirmed.
- The study explores age and gender differences in coping strategies utilization.

## ARTICLE INFO

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## ABSTRACT

Coping strategies adopted by children and adolescents play a crucial role in their mental health. This study aimed to develop the Arabic version of the Kidcope, assess its psychometric properties, and examine age and gender differences in the use of coping strategies by children and adolescents. A total of 800 children and adolescents siblings of patients with type 1 Diabetes mellitus completed the Kidcope scale. The developed Arabic Kidcope was checked for its construct validity, reliability, reproducibility, and confirmed by confirmatory factor analysis (CFA). Age and gender differences in coping styles utilization were assessed by one-way analysis of variance (ANOVA) and student t tests. Kidcope chid version yielded a three factors model by exploratory factor analysis (EFA). Overall, the 15-items revealed good internal consistency, Cronbach's alpha (0.89), and an intra-class correlation coefficient (ICC) of 0.82. EFA identified a two-factor solution for adolescents' Kidcope version. Overall, the 11-items showed acceptable internal consistency, Cronbach's alpha (0.74), and satisfactory (ICC) of 0.84. For both versions, the CFA supported the yielded factors models with good model fit indices. Developmental age changes were apparent for problem-solving, emotional regulation, and distraction coping strategies, and girls showed an enhanced use of adaptive strategies (problem-solving, social support). The Arabic Kidcope version is a reliable and valid tool to measure coping strategies used by children and adolescents.

## 1. Introduction

Stress is a condition in which an individual's capacity to respond to demands exceeds the ability to respond, and it can have both physical and psychological effects [1]. According to the mental resilience hypothesis, an individual can become physically and psychologically stronger by enduring some tolerable stressors with recovery intervals in between, while chronic stress is linked to an increased risk of psychological maladjustment [2]. There are several approaches to adapting to a distressing situation. Coping is the mindful energy we make to solve difficulties and relieve tension. Lazarus & Folkman, one of the pioneers of the cognitive theories, defined coping as a dynamic interplay of both mental and behavioral efforts to tackle the stressors that are puzzled or beyond the individual capabilities [3]. Coping is the conscious [4] and subconscious [5] responses to stress as, on repetition the initial effortful voluntary responses may become an automatic response [6]. In psychology, coping mechanisms or strategies are a collection of adaptive tools that we adopt to evade burnout, which can be our thoughts, emotions, behaviours, actions, and rely on our character designs [6]. Personal characteristics play a significant role in the determination of stress perception and coping abilities. What distinguishes people in terms of how they manage stress, however, remains unknown [7]. Another

* Corresponding author.
*E-mail address:* rehamibrahim@med.asu.edu.eg (R.I. Abdelmageed).

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unsolved concern in the coping research is whether people develop inclinations to react with the same coping styles in different contexts and over time or whether they alter their coping strategies based on the situational obstacles they face [8]. Moreover, individuals frequently utilize several coping methods in reaction to stressful circumstances since coping strategies can interact with each other [9].

While the hundreds of specific coping strategies with several distinctions categorization addressed to the main broad classification are available today [10], these distinctions do not set a proper model through which it is possible to figure all coping responses [8]. Psychologists vary in how they conceptualize coping categorization from more comprehensive to the narrowest scope such as problem-focused/emotion-focused coping [3], engagement/disengagement coping [10, 11], approach/avoidance coping [12], assimilation (primary control)/accommodation (secondary control) [13, 14], efficient (logical, detached)/inefficient coping styles (emotional, avoidant) [15], positive/negative/avoidant coping [16].

Nevertheless, many of these strategies can be beneficial, some believe that those who employ problem-focused coping strategies will adjust to life more efficiently. A problem-focused coping style may provide an individual with a better sense of control over their problem, while emotion-focused coping can occasionally result in a loss of control [6].

Although there is an ambiguity about how different coping mechanisms relate to individual health, there is a consensus in the literature that adaptive coping strategies are associated with better psychological well-being [17], and maladaptive coping strategies, in contrast, are related to emotional maladjustment, including anxiety and depression symptoms especially with avoidance coping style [18]. Furthermore, the influence of a given coping strategy changes over time, with responses that are effective one day may become ineffective in various situations and time frames [19].

Numerous coping instruments have been developed [20, 21, 22]. Given the relatively small number of available measures for assessing coping mechanisms in children, Kidcope developed by Spirito et al. (1988) is a self-report, multidimensional measure of children's coping strategies that are utilized worldwide [23, 24]. The Kidcope is a brief screening tool for evaluating children's and adolescent's coping strategies [24]that used in various settings, such as in disease conditions [25, 26] following catastrophes [27, 28], or normal children and adolescents [29] and designed to fill the gap between research and clinical application. Make it possible to evaluate improvements in a child's coping strategies with stressful situations like illness, parental separation, and bullying since the author of this measure highlights the scale's ability to be re-administered [16]. Spirito claims that a brief measure of coping mechanism is preferable to interviewing procedures, particularly with children, because interviews may be time-consuming, which is a significant disadvantage when researching younger groups [24]. The Kidcope enables children to reveal the most stressful situation in their life and analyze ten coping strategies (distraction, social withdrawal, self-criticism, blaming others, emotional regulation, problem-solving, cognitive restructuring, wishful thinking, social support and resignation) relevant to the current situation. Spirito et al. (1994) suggested a three-factor structure for the Kidcope, with avoidant, negative, and active coping; however, this hypothesis has not been tested and verified [16].

The Kidcope has been translated and utilized for measuring coping of children and adolescents from different cultures and countries, including Chinese [30]; German [31]; Sudanese and Ugandan [27]; Turkish [32]; Spanish [33], and Norwegian [34], the scale has yet to be translated into Arabic, however. Although it is convenient for administration as a screening tool, its psychometric properties and factor structure have differing outcomes as coping measure's factor structure is likely to differ depending on the population and the type of stressors they faced.

In Egypt, children and adolescents are potentially exposed to different stressors (e.g. violence, poverty and economic difficulty, health-related problems, inadequate resources) that may affect their development and mental health [35]. In this regard, the Kidcope may help identify diversity in the type of difficulties and coping strategies used by children living under stress.

However, the paucity of work on coping strategies in children and adolescents in Egypt, yet no validated Arabic-language tool measures childrens' perspectives on coping, limit the possibilities to assess coping strategies. This study, therefore, aimed to translate the Kidcope scale to Arabic and evaluate its psychometric properties for measuring coping strategies among children and adolescents. Moreover, we aimed to investigate age and gender differences in the adoption of coping strategies.

## 2. Patients and methods

### 2.1. Participants

This cross-sectional study included 800 children and adolescents (400 for each) between the ages of 7 and 17 years between October 2020 till April 2021. The participants are the healthy siblings of patients with type 1 diabetes mellitus that are being followed up in the Diabetic clinic at Children's Hospital Ain Shams University, Cairo, Egypt.

### 2.2. Procedure

The participants were approached through their mothers while awaiting medical appointments with their sibling in the diabetic clinic, and those whose mothers returned signed consent forms were invited to participate in the study. The research personnel interviewed the healthy siblings in the presence of their mothers to clarify the study goals and identify the process by which they cope with the event of their sibling's disease. The Kidcope scale was read to young children, and in a paper-pencil self-report format, adolescents completed the questionnaire independently. During the completion, study personnel remained nearby to answer any questions. Participants were excluded if they had cognitive impairment that may interfere with completing the questionnaire or not speaking Arabic fluently. This study was approved by the Ethics Committee of Ain Shams University Hospitals (Ethical Committee No. FMASU R/63).

### 2.3. Kidcope

The Kidcope is available in two self-report versions [23] for adolescents (aged 13–18 years) and children (5–13 years). Both versions assess the utility of the same 10 different coping strategies (problem-solving, social withdrawal, cognitive restructuring, social support, self-criticism, distraction, blaming others, wishful thinking, emotional regulation, and resignation). The adolescent version includes 11 items that scored for frequency of use on a 4-point, Likert-type scale (not at all to almost all the time). The children's version includes 15 items; these are split into different sentences from condensed adolescent version sentences to render sentences more understandable to children with the response of frequency of each coping strategy scored on a dichotomous scale (yes/no).

### 2.4. Translation

With the owner's permission of the scale, the English version of the Kidcope children/adolescent version was translated into Arabic by two independent bilingual certified professional translators. Then, the KIDCOPE was back-translated into English by another two professional licensed translators, one of them specialized in psychiatry. After that, a panel of ten professors from the Expert Committee merged the two versions and reviewed the equivalence, uniqueness, and discrepancies of the two versions. They used a four-point Likert scale ranging from 1 (not relevant) to 4 (extremely relevant) to assess each item's relevance. Content validity was examined by measuring the item-content validity index

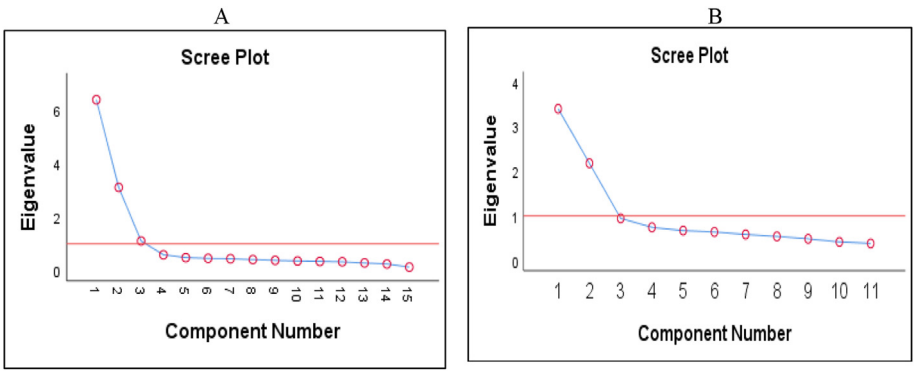


**Figure 1.** Scree plot of the Kidcope scale. A-Kidcope child version; B-Kidcope adolescents version.

(I-CVI). The mean of the I-CVI for all items on the scale was analyzed to evaluate the questionnaire content with a cut off value of 0.9 is considered excellent and 0.8 regarded as acceptable [36]. The survey items were tested by 50 children/adolescents to assess their opinion about appropriateness, ambiguity, and complexity in the pre-final edition. We made final changes to the scale based on the pilot findings and expert views.

### 2.5. Statistical analysis

The sample size was calculated using the PASS ® version 11 program, assuming a response rate of 50%,95% confidence level, and margin of error of 5 %. A further 5% was added to counteract the non-response rate or any errors in completing the questionnaires. Based on these assumptions, a sample size of at least 400 children and 400 adolescents will be needed.

Data were analyzed using SPSS© Statistics version 26 (SPSS© Corp., Armonk, NY, USA) and IBM AMOS V.24.0 for CFA. Descriptive statistics, such as frequency, mean, and standard deviation, were utilized. The data normality was examined by skewness and kurtosis ($\leq$2 for skewness and $\leq$7 for kurtosis [37].

We conducted maximum likelihood principal component analysis (PCA) on the 15 items (younger version) and 11 items (older version) of the Kidcope scale. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were used to examine the suitability of data for component analysis. A KMO value of $\geq$0.6 and a P-value $<$ 0.05 for Bartlett's Test were identified as criteria for sampling adequacy and feasibility of PCA [30]. Initial component extraction was based on a cutoff criterion of eigenvalue greater than 1. Besides, a scree plot was examined, and all components with eigenvalues situated on the sharp descent of the plot before it leveled out were retained. Based on the results of initial factor extraction, the principal components were rotated using an orthogonal (Varimax) rotation solution.

The internal consistency of items comprising each of the extracted principal components was examined separately using Cronbach's α with the acceptable alpha values $\geq$of 0.6. The intra-class correlation coefficients (ICC) were used to assess test-retest reliability with an acceptable ICC level of reproducibility $\geq$0.7. Confirmatory factor analysis (CFA) was used to verify the EFA structure and assess model fitness. The models' goodness of fit, was assessed by overall $\chi^2$ values and the following indices: Adjusted Goodness of Fit Index (AGFI), goodness-of-fit

**Table 1.** Component loadings of the three-factors model of the Kidcope-younger version.

| Item | Factor loading | | |
|---|---|---|---|
| | Factor 1 | Factor 2 | Factor 3 |
| (1) I just tried to forget it. | **0.808** | 0.064 | 0.063 |
| (2) I did something like watch TV or played a game to forget it. | **0.701** | 0.220 | 0.229 |
| (3) I stayed by myself. | **0.787** | 0.128 | 0.210 |
| (4) I kept quiet about the problem. | **0.762** | 0.101 | 0.254 |
| (5) I tried to see the good side of things. | 0.123 | **0.801** | 0.020 |
| (6) I blamed myself for causing the problem. | 0.465 | 0.019 | **0.807** |
| (7) I blamed someone else for causing the problem. | 0.247 | 0.056 | **0.832** |
| (8) I tried to fix the problem by thinking of answers. | 0.069 | **0.836** | 0.121 |
| (9) I tried to fix the problem by doing something or talking to someone. | 0.125 | **0.817** | 0.032 |
| (10) I yelled, screamed, or got mad. | 0.409 | 0.039 | **0.819** |
| (11) I tried to calm myself down. | 0.040 | **0.819** | 0.050 |
| (12) I wished the problem had never happened. | **0.741** | 0.058 | 0.404 |
| (13) I wished I could make things different. | **0.841** | 0.074 | 0.218 |
| (14) I tried to feel better by spending time with others like family, grownups, or friends. | 0.088 | **0.804** | −0.059 |
| (15) I didn't do anything because the problem couldn't be fixed. | **0.750** | 0.037 | 0.345 |
| Rotation Sums of Squared Loadings | | | |
| % of variance | 31.001 | 22.804 | 16.869 |
| Cumulative% | 31.001 | 53.805 | 70.674 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Bold indicates that a certain item represents a specific subscale.

**Table 2.** Component loadings of the two-factors model of the Kidcope-older version.

| Item | Factor loading | |
|---|---|---|
| | Factor 1 | Factor 2 |
| (1) I thought about something else; tried to forget it; and/or went and did something like watch TV or play a game to get it off my mind. | **0.631** | −0.114 |
| (2) I stayed away from people; kept my feelings to myself; and just handled the situation on my own. | **0.627** | 0.090 |
| (3) I tried to see the good side of things and/or concentrated on something good that could come out of the situation. | −0.021 | **0.811** |
| (4) I realized I brought the problem on myself and blamed myself for causing it. | **0.779** | 0.097 |
| (5) I realized that someone else caused the problem and blamed them for making me go through this. | **0.688** | 0.061 |
| (6) I thought of ways to solve the problem; talked to others to get more facts and information about the problem and/or tried to actually solve the problem. | 0.077 | **0.694** |
| (7a) I talked about how I was feeling; yelled, screamed, or hit something. | **0.757** | 0.053 |
| (7b) Tried to calm myself by talking to myself, praying, taking a walk, or just trying to relax. | 0.017 | **0.809** |
| (8) I kept thinking and wishing this had never happened; and/or that I could change what had happened. | **0.651** | 0.055 |
| (9) Turned to my family, friends, or other adults to help me feel better. | 0.087 | **0.653** |
| (10) I just accepted the problem because I knew I couldn't do anything about it. | **0.650** | 0.043 |
| Rotation Sums of Squared Loadings | | |
| % of variance | 30.046 | 30.046 |
| Cumulative% | 20.567 | 50.613 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Bold indicates that a certain item represents a specific subscale.

index (GFI), normed fit index (NFI), Tucker-Lewis index (TLI), comparative fit index (CFI), the standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA). The Cut off Criteria of good model fit measures as follows; AGFI, GFI, CFI, and NFI >0.9, $\chi^2$/df (1–3), SRMR<0.08, and RMSEA <0.06 [31]. Age and gender statistical comparisons were performed with one-way analysis of variance (ANOVA) followed by Tukey's post hoc test, and student t tests as appropriate.

## 3. Results

Of 800 children/adolescents included in the study, the mean age of the children was 8.99 ± 1.29 years, range (7–11) years, with girls constituted 50.25 % of the children group and, the mean age of the adolescents was 15.05 ± 1.63 years, range (12–17) years with boys constituted 50.75% of the adolescent group. The skewness (in the younger version, it ranged between −0.33 and 0.80; in the older version, it ranged between −1.08 and 0.68) and kurtosis (in the younger version, it ranged between −2.0 and −1.36; in the older version, it ranged between −1.04 and 3.10) that suggested normality of the data.

### 3.1. Construct validity

#### 3.1.1. Exploratory factor analysis

Results indicated that the data was suitable for component detection (Kaiser-Meyer-Olkin (KMO) statistic in younger and older Kidcope version equals (0.911, 0.819) respectively; Bartlett's Test of Sphericity is statistically significant (P-value <0.001) with a chi-square test value in younger and older version equals ($\chi^2$ = 3822.34, df = 105) and ($\chi^2$ = 1131.28, df = 55) respectively).

To examine the underlying factors of the Kidcope, we used the Maximum Likelihood method. Eigenvalues and scree plots were also used to determine the number of factors (Figure 1).

The result of extraction factor analysis the showed that Kidcope younger version has three extracted factors, and the Kidcope older version has two extracted factors with Eigenvalues above one.

Table 1 details item loadings of extracted factors of the Kidcope younger version. Factor 1 included seven items that explained 31% of the variance and labelled Avoidant coping that measured distraction (item 1,2), social withdrawal (item 3,4), wishful thinking (item 12,13), and resignation (item 15). Factor 2 included five items that explained 22.8% of the variance and labelled Active coping that measured cognitive restructuring (item 5), problem-solving (item 8,9), positive emotional regulation (item 11), and social support (item 14). Factor 3 included three items that explained 16.8% of the variance and labelled Negative coping that measured self-criticism (item 6), blaming others (item 7), and negative emotional regulation (item 10).

Table 2 details item loadings of extracted factors of the Kidcope older version. Factor 1 included four items that explained 30.04% of

**Table 3.** Internal consistency of factors.

| Younger Version | | |
|---|---|---|
| Cronbach's α | Item | Cronbach's α if item is deleted |
| Factor 1 0.916 | Item 1 | 0.908 |
| | Item 2 | 0.910 |
| | Item 3 | 0.902 |
| | Item 4 | 0.903 |
| | Item 12 | 0.900 |
| | Item 13 | 0.896 |
| | Item 15 | 0.902 |
| Factor 2 0.880 | Item 5 | 0.857 |
| | Item 8 | 0.847 |
| | Item 9 | 0.852 |
| | Item 11 | 0.854 |
| | Item 14 | 0.859 |
| Factor 3 0.890 | Item 6 | 0.784 |
| | Item 7 | 0.925 |
| | Item 10 | 0.817 |
| **Older Version** | | |
| Factor 1 0.811 | Item 1 | 0.797 |
| | Item 2 | 0.796 |
| | Item 4 | 0.766 |
| | Item 5 | 0.785 |
| | Item 7a | 0.772 |
| | Item 8 | 0.792 |
| | Item 10 | 0.792 |
| Factor 2 0.724 | Item 3 | 0.615 |
| | Item 6 | 0.694 |
| | Item7b | 0.617 |
| | Item 9 | 0.726 |

**Table 4.** Confirmatory factor analysis for Kidcope: Fit indices.

| CFA Index | GFI | AGFI | CFI | NFI | TLI | SRMR | RMSEA | CMIN/df | P-value |
|---|---|---|---|---|---|---|---|---|---|
| Younger version | 0.94 | 0.92 | 0.96 | 0.95 | 0.97 | 0.04 | 0.04 | 1.93 | 0.00 |
| Older version | 0.96 | 0.93 | 0.96 | 0.94 | 0.94 | 0.06 | 0.05 | 2.24 | 0.00 |

**Abbreviations:** GFI: Goodness-of-fit index; AGFI: Adjusted Goodness of Fit Index; CFI: Comparative fit index; NFI: Normed fit index; TLI: Tucker-Lewis index; SRMR: Standardized root mean square residual; RMSEA: Root mean square error of approximation; CMIN/df: Chi-square/degree-of-freedom ratio. Fit indices: AGFI, GFI, CFI, TLI and NFI >0.9, SRMR<0.08, and RMSEA <0.06, CMIN/df (1–3).

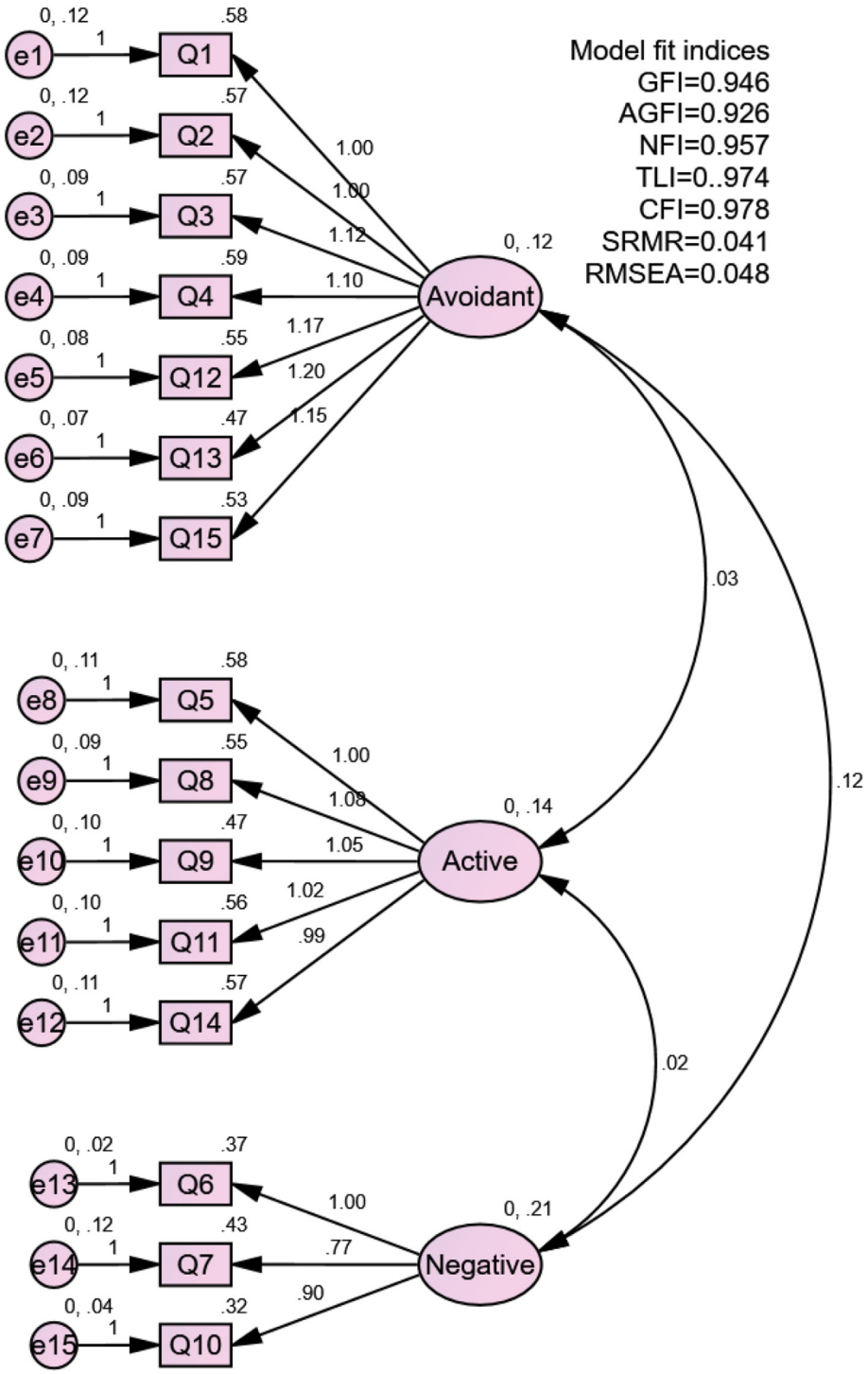


**Figure 2.** Confirmatory factor analysis of the Kidcope child version.

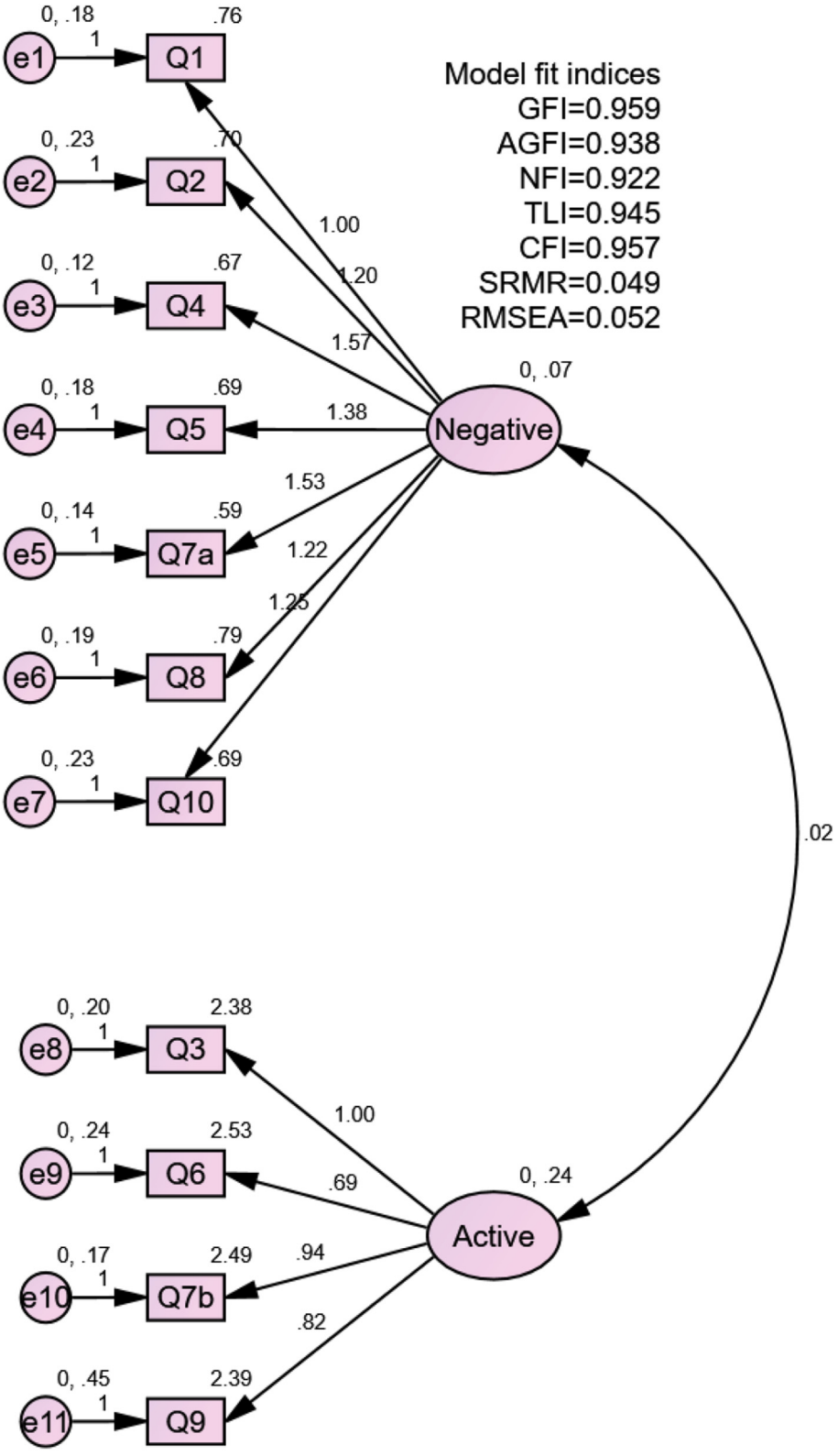


**Figure 3.** Confirmatory factor analysis of the Kidcope adolescents version.

the variance and labelled Negative coping that measured distraction (item 1), social withdrawal (item 2), self-criticism (item 4), blaming others (item 5), and negative emotional regulation (item 7a), wishful thinking (item 8), and resignation (item 10). Factor 2 included four items that explained 20.56% of the variance and labelled Active coping that measured cognitive restructuring (item 3), problem-solving (item 6), positive emotional regulation (item 7b), and social support (item 9).

**Table 5.** T values obtained from CFA for Kidcope.

| Younger version | T values |
|---|---|
| Factor 1 | 7.96 |
| Factor 2 | 8.41 |
| Factor 3 | 12.62 |
| Older version | |
| Factor 1 | 5.11 |
| Factor 2 | 7.13 |

Significant at the 0.01 level.

### 3.2. Reliability of the Kidcope

#### 3.2.1. Internal consistency

Table 3 shows the internal consistency of the Kidcope. The overall Cronbach's alpha of the 15 items Kidcope younger version was 0.895 with factors values ranged between 0.880 and 0.916, which are considered good to excellent whereas, the overall Cronbach's alpha of the 11 items Kidcope older version was 0.743 with factors values ranged between 0.72 and 0.81 which are considered acceptable to good.

#### 3.2.2. Test-retest reliability

125 participants (60 children, 65 adolescents) included in the test-retest reliability analysis and completed the Kidcope questionnaire twice within a one-week recall period. The ICC of the younger version overall scale was 0.819, with subscales values ranging from 0.762 to 0.806, while the older version overall scale had an ICC of 0.845, with subscales values ranging from 0.706 to 0.812. these values indicated acceptable and good reliability.

### 3.3. Confirmatory factor analysis

The factors models for both the adolescent and the younger versions of the Kidcope as suggested by EFA were tested by the CFA. Table 4 shows the fit indices thresholds and CFA findings. The results indicated a good model fit, with all items having a factor loading above 0.3; therefore, no items were removed from the models (Figures 2 and 3). T-values of the underlying factors of Kidcope obtained from CFA that are more than 2.56 and significant at the 0.01 level [38] are shown in Table 5.

### 3.4. Age and gender comparison

Participants were classified into three age groups (middle to late childhood (7–11 years), early adolescence (12–14 years), and late adolescent (15–17 years), and all participants' ratings were standardized to assess the age and gender differences in coping patterns. Table 6 demonstrates the endorsement of coping strategies among children and adolescents that revealed a significant age effect on the following coping strategies (distraction, emotional regulation, problem-solving, and cognitive restructuring). Negative coping strategies, such as self-criticism and blaming others, were used the least by children and adolescents. In terms of gender comparison, girls showed significantly increased adaptive coping strategies (problem-solving, cognitive restructuring and social support) than boys.

## 4. Discussion

The study is the first to assess the psychometric properties of the Arabic version of the KIDCOPE scale. The original Kidcope scale's factor structure was not considered in the initial development of the scale though, Spirito et al (1994) had grouped the ten coping strategies into three subscales as active (problem-solving, social support, cognitive restructuring, and emotional regulation), avoidant (wishful thinking, social withdrawal, resignation, and distraction), and negative (self-criticism and blaming others) coping strategies [16] despite these theoretical subscales did not subject to the factorial analytical structure.

In this study, EFA with child version resulted in three factors solution labeled as (Avoidant, Active, and Negative) coping as indicated by EFA and yielded good model fit indices by CFA. Except for emotional regulation items (10,11) that loaded on two separate factors, as item 10"I yelled, screamed, or got mad" loaded with Negative coping while item 11 "I tried to calm myself down" loaded with Active coping, the extracted factors align with Spirito et al.'s (1994) [16]suggested factors. Similarly, Vigna et al. (2010) reported three factors models labeled as Problem-avoidant Coping, Internalized, and Externalized Negative Coping with the content of each factor differed from our suggested factor categorization [39]. This discrepancy may be due to the distinct characteristics of the two samples since Vigna et al. (2010) studied a population of hurricane-exposed, African American, marginalized children, while the present study used healthy siblings of diabetic patients. One study with Caucasian and Hispanic American victims of the Hurricane

**Table 6.** Distribution of the Kidcope coping strategies in children and adolescents by age group and by gender.

| Strategy | Age group | | | | | | | | Gender | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Middle/late childhood (n = 400) | | Early adolescence (n = 165) | | Middle adolescence (n = 235) | | Test of significance | | Boys (n = 402) | | Girls (n = 398) | | Test of significance | |
| | | | | | | | Value | P-Value | | | | | Value | P-Value |
| | M | SD | M | SD | M | SD | F | | M | SD | M | SD | t | |
| Distraction | 1.28 | 0.92 | 0.93 | 0.73 | 0.90 | 0.66 | 21.36 | 0.001*** | 1.07 | 0.82 | 1.13 | 0.84 | −0.95 | 0.34 |
| Social Withdrawal | 0.95 | 0.86 | 1.07 | 1.01 | 1.03 | 0.98 | 1.09 | 0.33 | 1.02 | 0.92 | 0.98 | 0.94 | 0.53 | 0.59 |
| Wishful Thinking | 0.90 | 0.85 | 1.09 | 0.99 | 1.01 | 0.99 | 2.66 | 0.07 | 0.98 | 0.93 | 096 | 0.92 | 0.30 | 0.75 |
| Resignation | 0.81 | 0.71 | 0.84 | 0.75 | 0.87 | 0.73 | 0.54 | 0.58 | 0.79 | 0.72 | 0.87 | 0.73 | −1.56 | 0.12 |
| Self-Criticism | 0.42 | 0.49 | 0.45 | 0.51 | 0.52 | 0.58 | 2.64 | 0.07 | 0.47 | 0.54 | 0.44 | 0.51 | 0.81 | 0.41 |
| Blaming Others | 0.45 | 0.49 | 0.47 | 0.52 | 0.50 | 0.57 | 0.76 | 0.46 | 0.46 | 0.53 | 0.48 | 0.52 | −0.59 | 0.55 |
| Emotional Regulation | 0.91 | 0.72 | 2.04 | 1.80 | 1.91 | 1.90 | 55.20 | 0.001*** | 1.34 | 1.47 | 1.54 | 1.54 | −1.86 | 0.62 |
| Problem Solving | 1.04 | 0.90 | 1.68 | 1.15 | 1.77 | 1.10 | 46.81 | 0.001*** | 1.26 | 1.07 | 1.52 | 1.06 | −3.35 | 0.001 *** |
| Cognitive Restructuring | 0.71 | 0.45 | 1.40 | 1.24 | 1.42 | 1.28 | 53.46 | 0.001*** | 0.99 | 0.95 | 1.14 | 1.06 | −2.11 | 0.035* |
| Social Support | 0.89 | 0.30 | 1.02 | 1.27 | 1.05 | 1.28 | 2.47 | 0.08 | 0.89 | 0.89 | 1.05 | 0.96 | −2.43 | 0.01 ** |

Data presented as mean ± SD; *p < 0.05; **p < 0.01; ***p < 0.001.
Student t-test of significance (t = t-test value).
(F) One-way analysis of variance (ANOVA).

Andrew disaster concluded that the Kidcope has a four-factor model labeled as Positive Coping, Blame and Anger, Wishful Thinking, and Social Withdrawal when used the child version [31].

With regard to the Kidcope with adolescents, EFA resulted in a two-factor solution labeled as (Negative and Active) coping with good model fit indices as indicated by CFA, unlike the original version that grouped ten coping strategies into three main categories (Active, Avoidant and Negative) coping. Similarly, Cheng and Chan (2003) found the same two-factor approach in a study of Chinese teenagers, naming it Escape-Oriented Coping (distraction, social withdrawal, self-criticism, blaming others, wishful thinking, emotional outburst, and resignation) and Control-Oriented Coping (cognitive restructuring, problem-solving, relaxation, and social support) with satisfactory model fit by CFA (CFIs $<0.91$, RMSEA $<0.057$) [30]. While Bedel et al. (2014) found a three-factor model that aligns with the suggested original scale factors (Active, Negative, and Avoidant) coping with adequate model fit indices (GFI $= 0.97$, AGFI $= 0.95$, CFI $= 0.92$, RMSEA $= 0.047$) using the Turkish adolescent version of the Kidcope [32], Vigna et al. (2010) concluded the Kidcope adolescent version's unidimensional structure as 11 items loaded on a one-factor model implying that coping strategies utilized by a subset of African American teenagers may be closely intertwined [39].

So, the results of these studies yielded different factor structures with changing the content of each factor with the original version wondered if these differing outcomes are a result of sample dissimilarity, variations in the design of stressful circumstances, and also indicate that the factor structure of Kidcope may vary across diverse samples.

With regard to the reliability of the Kidcope, the internal consistency of the younger version showed to be good with a Cronbach's alpha value of 0.89 with its three subscales displayed good to excellent internal consistencies. Previous results of the Kidcope child version showing moderately low reliabilities ranged from 0.41 to 0.64 in the three factors model [39], and in the four-factor model, Cronbach alpha ranged from 0.43 to 0.77 [31]. In this study, Cronbach's α values of two-factor solution for the adolescent version showed to be acceptable with a Cronbach's alpha value of 0.74 with its two subscales displayed acceptable to good internal consistencies similar to that reported in previous studies with Cronbach alpha ranged from 0.65 to 0.76 regardless of factor model (one, two, or three) [30, 32, 39]. Overall the test-retest reliability results for the Kidcope scale child/adolescent version and its subscales were satisfactory with the overall scale ICCs of 0.82 and 0.84 for the younger and older, respectively, indicating good Arabic kid cope reproducibility. These values are comparable to those found in the original version with high values ($r = 0.41$ to $r = 0.83$) over three to seven-day intervals [23].

The emergence of three factors in the younger children may imply that their coping approaches are more differentiated than adolescents, a finding similar to that presented in previous studies using Kidcope [39, 40]. Contradictory to our results, Skinner & Zimmer-Gembeck reported that developmentally coping behaviors displayed more differentiation with increasing age [5]. Nonetheless, several studies failed to determine developmental age variations, implying modest consistency of related coping strategies across various stressors and age ranges [41, 42].

The present study showed developmental patterns changes in distraction and emotional regulation coping strategies utilization as it decreases with age in the former and increases with age in the latter. These findings are in line with the results of previous research [29, 40, 43]. Similarly, developmental increase with age was observed in cognitive restructuring, and problem-solving that is consistent with the developmental literature that defined an age window for changing coping patterns as children get older, using more cognitive representations of problem-solving [5]. Contradictory to our findings, several cohort studies supported the assumption of acquiring problem-solving capabilities in early childhood and its stability throughout childhood and adolescence [40, 43, 44]. In line with literature, no age difference was observed in social support [43, 45]. Several studies, however, concluded on the marked inconsistencies in age trends for each style of examined coping as shown mixed results of increases, decreases, and no differences [9]. Out of 10 coping strategies, increases in problem-solving, cognitive restructuring, and social support strategies in girls were found that is compatible with studies reported an increase in utility of these positive approaches in females [9, 41]. This could reflect that girls were more likely than boys to handle stressors utilizing social resources, interact in emphatic self-talk, and show effective problem-focused coping; however, Hampel & Petermann [43] found that females were less likely to use problem-focused coping strategies. Unlike most published results showing the increase in avoidant coping in males [9, 43, 44], we found a lack of gender differences in avoidant coping such as (distraction, social withdrawal or wishful thinking). One possible explanation could be that distinctive characteristic of the stressors, variety of coping measures may impact gender variations in coping strategies among children and adolescents, thus several cohort studies concerning gender effect on coping in children and adolescents showed mixed outcomes [4, 46].

This cross-sectional study has some limitations, using a self-report measure that may have resulted in response prejudices. The use of a convenient sample of healthy siblings from a single clinic as it would be beneficial to include a diversity of the participants from different clinics to get a better understanding of their coping mechanisms in varying disease scenarios, however, the large sample size raises the possibility of results being representational. We did not perform a convergent validity test that could provide further evidence for the Arabic Kidcope's validity.

## 5. Conclusion

Research on coping strategies in Egypt is limited, with no available culturally validated tool for use with children and adolescents. To our knowledge, this is the first study in an Arab country to validate the Arabic version of the Kidcope. Overall, the Kidcope appeared to be a valid and reliable instrument to assess coping strategies in Egyptian children and adolescents. Expected differences in the use of coping strategies by age and gender were also remarked.

### 5.1. Recommendation

The study findings show that Kidcope in its Arabic version is suitable for use in Egypt and the neighbouring Arab nations, where the Arabic language is the official, based on linguistic and cultural similarities. This instrument is expected to aid researchers in screening children's coping styles and becoming a part of clinical guidelines for childcare, guiding interventions aimed to minimize the potential consequences of coping with a stressful situation while also meeting the child's biopsychosocial demands. Furthermore, the psychometric properties of the Arabic version of the Kidcope suggest the utility of this tool in clinical and epidemiological studies.

## Declarations

### Author contribution statement

Reham I. Abdelmageed, Asmaa W. Abdelaziz: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Yasmine I. Elhenawy: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

Dalia K. Zaafar: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

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### Data availability statement

Data will be made available on request.

### Declaration of interests statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

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