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Validation of the Brief Coping Orientation to Problem Experienced (Brief COPE) inventory in people living with HIV/AIDS in Vietnam

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Abstract: The Brief Coping Orientation to Problem Experienced (Brief COPE) inventory is one of the most widely used instruments in coping research; however, no study has evaluated the psychometric properties of the Brief COPE in the Vietnamese population. This study aimed to validate a culturally appropriate Vietnamese version of the Brief COPE for the evaluation of coping strategies in people living with HIV/AIDS in Vietnam. We translated the Brief COPE into Vietnamese, and it was self-administered among 1,164 HIV-infected patients receiving antiretroviral therapy at a large HIV outpatient clinic in Hanoi between January 2019 and March 2020. Data on demographics and HIV-related information, depression and social support were also collected. Confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) were conducted to assess construct validity. Content validity, internal consistency, and convergent validity were also assessed. The CFA of a 14-factor structure of the original Brief COPE revealed acceptable model fitness, but poor internal consistency for some subscales. In the subsequent EFA, we found a revised 26-item version which had a six-factor structure consisting of problem-solving, avoidance, humor, social support, religion, and substance use. The final CFA found that the model fitness of the revised scale with fewer factor structures was comparable to that of the original Brief COPE; the internal consistency of the revised scale was even better than that of the original scale. Furthermore, six factors of the revised scale showed anticipated associations with depression and social support.

Keywords: confirmatory factor analysis, explanatory factor analysis, coping

Introduction

Coping is defined as cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person (*1*). When facing difficult situations, coping strategies available to and employed by an individual determine experience, severity of stress, and pathological consequences (*2*). Thus, different types of coping strategies could have protective or harmful effects on individual health and well-being (*3*).

Approximately 230,000 people in Vietnam are living with HIV/AIDS in 2018 (*4*); the HIV epidemic is concentrated in key populations, including people who inject drugs and sex workers (*5*). Although improved access to antiretroviral therapy (ART) has increased the life expectancy of people living with HIV/AIDS (PLWHA), the chronic course of HIV infection requires patients to cope with various forms of psychosocial stress associated with fear of death, opportunistic infection,

and side effects of ART (*6*). In addition, multiple stigmas due to social prejudices against their behavior and their serostatus cause strong discrimination against the HIV population, especially in Vietnam (*6-8*). Given that psychosocial stress is negatively associated with ART adherence, leading to poor treatment outcomes (*9,10*), and that depression is prevalent in PLWHA in Vietnam (*11*), it is important to evaluate their stress coping strategies to reduce stress-related burdens.

The Brief COPE (*12*) is an abbreviated version of the 60-item Coping Orientation to Problems Experienced (COPE) Inventory (*13*) based on Lazarus's transaction model of stress (*1*) and Carver's self-regulation model (*14,15*). Although it is a widely used instrument in coping research among various groups (healthy individuals (*16-18*), ill individuals including those infected with HIV (*19-23*), and caregivers (*19,24*)), no study has evaluated the psychometric properties of the Brief COPE in the Vietnamese population. This multidimensional scale consists of 28 items that measure

14 coping strategies of two items each. However, such a fragmented structure may limit the usefulness of this scale in both clinical and research settings, making statistical interpretation and dissemination of a scientific message difficult. In addition, coping strategies may differ across cultural context. Culture defines stressors, emotional responses, and language used to describe them. Therefore, previous studies explored and suggested structures with fewer factors (*i.e.*, four (*19*), five (*21*), six (*23*), seven (*20*), and eight (*17*)), which may be more sensitive to their sociocultural contexts.

In response to the needs for culturally relevant, validated scales to measure the coping strategies of the HIV population in Vietnam, this study aimed to validate a culturally appropriate Vietnamese version of the Brief COPE for the evaluation of coping strategies in PLWHA in Vietnam.

Material and Methods

Participants

Between January 2019 and March 2020, we conducted a self-administered questionnaire survey using a hospital-based cohort of PLWHA on ART (aged ≥ 18 years). This cohort, the so-called Hanoi cohort, was established in 2007 at the HIV outpatient clinic at the National Hospital for Tropical Diseases (NHTD) in Hanoi, Vietnam. Since then, 1,820 patients have registered for the Hanoi cohort, and 1,287 were still enrolled and underwent follow-up in the study periods. Among those, 1,164 agreed and participated in the survey. The survey for the remaining 123 patients was scheduled in March and April 2020, but it was interrupted due to the epidemic of coronavirus disease 2019 (COVID-19). Since some measurements like depression may be largely affected by the epidemic, we only used data obtained before the epidemic. The semi-structured questionnaire was administered to the participants during their regular consultations. A nurse was assigned to provide appropriate support if the participants encountered difficulties when responding to the questionnaires.

Each participant provided written informed consent. The study was approved by the Human Research Ethics Committee of the National Center for Global Health and Medicine (reference: NCGM-G-002537-00) and NHTD (reference: 15/HDDD-NDTU).

Measurements

Demographics and HIV-related factors
The following data on demographic and HIV-related factors were collected: sex, age, marital status, number of household members, residence, employment, income, educational attainment, social health insurance status, time from HIV diagnosis, route of HIV transmission, and HIV disclosure status.

Brief COPE
The Brief COPE can be used to assess situational coping strategies (ways people cope with a specific stressful event) and dispositional coping strategies (usual ways people cope with stress in everyday life); we assessed the latter ones in this study. The scale measures 14 coping subscales with two items each, which are as follows: self-distraction, active coping, denial, substance use, emotional support, instrumental support, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, religion, and self-blame. For each item, respondents indicate whether they use the coping response on a four-point Likert scale (1 = I usually don't do this at all; 2 = I usually do this a little bit; 3 = I usually do this a medium amount; 4 = I usually do this a lot). Cronbach's alpha of original subscales ranged from 0.50 (venting) to 0.90 (substance use).

Center for Epidemiologic Studies Depression Scale (CES-D)
The CES-D is a well-known 20-item self-reporting scale for measuring depression symptoms (*25*). Responses were given on a four-point scale ranging from 0 (rarely or none of the time) to 3 (most or almost all the time), except for four items that were positively worded and scored in reverse. The reliability and validity of the Vietnamese version of the CES-D was confirmed in Vietnam's HIV population, with Cronbach's alpha of 0.81, and sensitivity and specificity of 79.8% and 83.0%, respectively, at the cut-off score of 16 (*26*).

Medical Outcome Study Social Support Survey (MOS-SSS)
The MOS-SSS is a self-administered scale developed to measure perceived availability of social support (*27*). The MOS-SSS consists of 19 items representing four types of social support: emotional/informational support (eight items), tangible support (four items), affectionate support (three items), positive social interaction (three items), and additional item (one item). The score for each item ranges from 0 (rarely or none of the time) to 5 (all of the time), with the higher score indicating more support perceived by respondents. The Vietnamese version of the MOS-SSS was previously validated in HIV outpatients on ART in the Hanoi cohort, with Cronbach's alpha of 0.95 for the overall score and 0.90-0.93 for the four subscales (*11*). This study also validated the structure of an original four-factor model of MOS-SSS with a comparative fit index of 0.96 and adjusted goodness of fit index of 0.89 in the confirmatory factor analysis (CFA).

Analytic approach

The following five steps were taken to validate the Vietnamese version of the Brief COPE: *i*) assessment of content validity, *ii*) translation, *iii*) assessment of

internal consistency and construct validity of the original scale, *iv*) assessment of the factor structure relevant to the HIV population in Vietnam, and *v*) assessment of internal consistency and construct and convergent validities of the revised scale. The contents of assessment in each step are described below.

Assessment of content validity
The content validity of the Brief COPE was determined by an expert panel that was formed by HIV/AIDS specialists, including HIV clinicians, social workers, and a social epidemiologist. The panel reviewed each item to check whether there was any item irrelevant or unsuitable in the Vietnam cultural context.

Translation
The original English version of the Brief COPE was translated into Vietnamese by a Vietnamese research member who is familiar with the HIV population. The instrument was then translated back to English by an independent translator, who has no knowledge of the questionnaire. The above mentioned expert panel determined the conceptual and cultural equivalence between the two versions. Then, five HIV patients in the NHTD were invited to complete the translated instruments for their review, in which respondents were asked to indicate any wording or expressions they did not understand or they found unacceptable or offensive in view of cultural norms. Those who attended the review were excluded from the main survey.

Assessment of internal consistency and construct validity of the original scale
The internal consistency of the original Brief COPE in this sample was assessed by calculating Cronbach's alpha for both overall score and each subscale. Alpha values ≥ 0.70 were indicative of good internal consistency (*28*). A CFA was also performed to assess the construct validity of the original 28-item, 14-factor structure in a sample of Vietnam's HIV population. The root mean square error of approximation (RMSEA), comparative fit index (CFI), normed fit index (NFI), non-normed fit index (NNFI), and goodness of fit index (GFI) were calculated to test the model fit. CFI, NFI, NNFI, and GFI values ≥ 0.9 (*29*) and an RMSEA value ≤ 0.08 was indicative of a good model fit (*30*).

Assessment of the factor structure relevant to the HIV population in Vietnam
To explore a better structure, preferably with fewer factors, an exploratory factor analysis (EFA) of the original Brief COPE was carried out using the maximum-likelihood extraction with varimax rotation on the entire sample. The Kaiser-Meyer-Olkin (KMO) and Bartlett's sphericity tests were used to examine the sampling adequacy of data that were used for the EFA. The number of factors with eigenvalue ≥ 1.0 was retained for

the analysis (*31*). The items with factor loading of ≥ 0.4 were also retained. In the case of multiple loading of an item on several factors and of factor loading < 0.4, the conceptual relationship to the factors and the relevance in Vietnam's sociocultural context were considered.

Assessment of internal consistency and construct and convergent validities of the revised scale
The internal consistency of the revised scale was assessed by calculating Cronbach's alpha for both overall score and each subscale. Using the revised scale derived from the steps above, the final CFA was performed. The model fit explained by the fitness indices (*i.e.*, RMSEA, CFI, NFI, NNFI, and GFI) was compared between the original 28-item, 14-factor scale and the revised scale. In addition, given the association between coping and depression (*32,33*) and social support (*34,35*), the convergent validity was examined by evaluating the association of the revised scale with depression measured using CES-D and social support measured using MOS-SSS. The mean scores of each subscale in the revised scale were compared between depressed and not depressed individuals defined by CES-D ≥ 16 or less, and statistical significance was assessed by the *t*-test. Pearson correlation coefficients between each subscale score in the revised scale and the MOS-SSS scores were also calculated.

All analyses were performed using SAS 9.4 software (SAS Institute Inc., Cary, NC, USA). Missing data were excluded from the analyses.

Results

Sociodemographic characteristics

The characteristics of the 1,164 participants are described in Table 1. Among all participants, 58.1% were male and 41.9% were female, with median age (interquartile range [IQR]) of 41 (37-45) years, 73.9% were married, and 53.8% were living outside Hanoi. More than 80% of the respondents had been living with HIV for ≥ 7 years, and most of them had disclosed their HIV status to others. Moreover, 19.4% reported injections of drug and/or being a prisoner as their route of HIV transmission.

Content validity

The expert panel did not find any item which is not relevant or suitable to the construct of the coping strategies in the Vietnamese cultural context. Therefore, all 28 items were retained for the analyses. During the translation process, in response to the opinions from the expert panel and from the participants, minor changes were made to the Vietnamese translation of the scale to develop the final version (Supplemental Table S1, *https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=10*).

Table 1. Characteristics of the study participants

Variables	Sample, n = 1,164 n (%)
Sex	
Male	676 (58.1)
Female	488 (41.9)
Age	
Median (IQR)	41 (37, 45)
< 37	272 (23.4)
37-40	275 (23.6)
41-44	281 (24.1)
≥ 45	336 (28.9)
Marital status	
Single (without partner)	78 (6.7)
Married	860 (73.9)
Unmarried with partner	15 (1.3)
Widowed	129 (11.1)
Divorced	82 (7.0)
Number of household members	
1	45 (3.9)
2	143 (12.3)
3	375 (32.2)
≥ 4	601 (51.6)
Residence	
Hanoi	538 (46.2)
Other	626 (53.8)
Employment	
Full-time employment (employee)	441 (37.9)
Part-time employment (employee)	74 (6.4)
Working full-time (self-employed)	278 (23.9)
Working part-time (self-employed)	182 (15.6)
Jobless and not working at all[a]	189 (16.2)
Income (VND/month)[b]	
0-1,499,999	63 (5.4)
1,500,000-4,999,999	324 (27.8)
≥ 5,000,000	686 (58.9)
N/A	91 (7.8)
Educational attainment[c]	
Low	35 (3.0)
Middle	642 (55.2)
High	485 (41.7)
N/A	2 (0.17)
Social health insurance status	
Having an insurance card	1,093 (93.9)
Not having an insurance card	69 (5.9)
Unknown	1 (0.1)
N/A	1 (0.1)
Time from HIV diagnosis	
Median (IQR)	9.3 (7.3, 13.6)
< 7 years	215 (18.47)
7-13 years	672 (57.73)
≥ 14 years	277 (23.8)
Route of HIV transmission	
Men who have sex with men (MSM) or gay or lesbian	22 (1.9)
Sex worker	1 (0.09)
Injecting drug user or prisoner	226 (19.4)
Migrant worker	14 (1.2)
Others	901 (77.4)
HIV disclosure status	
Not having disclosed to anyone	57 (4.9)
Having disclosed to someone	1,107 (95.1)

N/A: Not available. [a]Including retirement. [b]1USD = approximately 23,000 VND; low, < 1,500,000 Vietnamese dong (VND); middle, 1,500,000-4,999,999 VND; high: ≥ 5,000,000 VND. [c]Low, never went to school or primary school; Middle, junior high school or high school; High, vocational school/college or university/graduate university.

Table 2. Model fit indices of the CFA for the original scale and revised scale

Model fit indices	Original scale 28 items, 14 factors	Revised scale 26 items, 6 factors
RMSEA[a]	0.07	0.07
CFI[b]	0.89	0.87
NFI[c]	0.87	0.85
NNFI[d]	0.83	0.85
GFI[e]	0.92	0.90

[a]Root mean square error of approximation. [b]Comparative fit index. [c]Normed fit index. [d]Non-normed fit index. [e]Goodness of fit index.

Construct validity

CFA of the original scale
The CFA of the original Brief COPE with 28 items of 14 factors suggested an acceptable model fit with RMSEA of 0.07 and GFI of 0.92, even though other indices were on the borderline of fitness (CFI = 0.89, NFI = 0.87, and NNFI = 0.83, respectively) (Table 2).

EFA of the original scale
The KMO value was 0.87, and Bartlett's sphericity test results were statistically significant with a *p* value of < 0.0001, which suggested that data were suitable for the factor analysis. The EFA of the original 28-item Brief COPE with varimax rotation identified a six-factor structure accounting for 46.4% of the total variance (Table 3). Both items from the acceptance and planning subscales and one item from the positive reframing and active coping subscales in the original Brief COPE was loaded on Factor 1 and named "problem-solving". Further, both items from the denial, self-blame, and behavioral disengagement subscales and one item from the self-distraction subscale were loaded on Factor 2 and named "avoidance". Both items from the humor subscale and one item from the self-distraction and positive reframing subscales were loaded on Factor 3 and named "humor". Both items from the use of instrumental support and emotional support subscales were loaded on a single factor (Factor 4) and named "social support". Although one item of the use of instrumental support ("I've been trying to get advice or help from other people about what to do") cross-loaded on Factor 1 and Factor 4, it was assigned to Factor 4 ("social support") as it was conceptually more related to this factor. Two items from the religion subscale and substance use subscale formed individual factors as the same as the original Brief COPE (Factor 5 and Factor 6) and were named "religion" and "substance use", respectively.

In addition, there were two items of venting ("I've been expressing my negative feelings" and "I've been saying things to let my unpleasant feelings escape") and one item from active coping ("I've been concentrating my efforts on doing something about the situation I'm in.") with factor loading < 0.4. Among these, we

Table 3. Factor loading from the explanatory factor analysis of the Brief COPE

Item of Brief COPE	Factors in Brief COPE	Factors					
		F1	F2	F3	F4	F5	F6
25. I've been thinking hard about what steps to take.	Planning	**0.74**	0.02	0.16	0.20	0.11	0.02
12. I've been trying to see it in a different light, to make it seem more positive.	Positive reframing	**0.68**	0.11	0.16	0.17	0.05	-0.01
24. I've been learning to live with it.	Acceptance	**0.66**	0.00	0.20	0.03	0.14	0.04
14. I've been trying to come up with a strategy about what to do.	Planning	**0.64**	0.05	0.13	0.22	0.05	-0.03
7. I've been taking action to try to make the situation better.	Active coping	**0.62**	0.09	0.18	0.23	0.02	-0.02
20. I've been accepting the reality of the fact that it has happened.	Acceptance	**0.58**	-0.02	0.00	0.13	0.19	0.01
2. I've been concentrating my efforts on doing something about the situation I'm in.	Active coping	**0.37**	0.20	0.01	0.02	0.21	0.03
8. I've been refusing to believe that it has happened.	Denial	0.03	**0.67**	0.14	0.01	0.02	0.03
3. I've been saying to myself "this isn't real."	Denial	0.06	**0.63**	0.13	0.01	0.02	0.05
13. I've been criticizing myself.	Self-blame	0.09	**0.54**	0.00	-0.08	-0.02	0.18
26. I've been blaming myself for things that happened.	Self-blame	0.10	**0.51**	0.02	-0.11	0.01	0.20
16. I've been giving up the attempt to cope.	Behavioral disengagement	-0.10	**0.50**	0.04	0.05	0.08	0.04
6. I've been giving up trying to deal with it.	Behavioral disengagement	0.02	**0.46**	0.08	-0.07	0.01	0.06
1. I've been turning to work or other activities to take my mind off things.	Self-distraction	0.14	**0.43**	0.32	-0.11	0.08	0.06
28. I've been making fun of the situation.	Humor	0.25	0.21	**0.75**	0.00	0.03	-0.01
19. I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.	Self-distraction	0.08	0.20	**0.71**	0.02	0.06	0.01
17. I've been looking for something good in what is happening.	Positive reframing	0.27	0.22	**0.69**	0.12	-0.01	0.03
18. I've been making jokes about it.	Humor	0.10	0.03	**0.59**	0.15	0.12	0.07
10. I've been getting help and advice from other people.	Use of instrumental support	0.38	-0.05	0.11	**0.64**	0.10	-0.04
15. I've been getting comfort and understanding from someone.	Use of emotional support	0.43	-0.09	0.11	**0.60**	0.07	-0.06
5. I've been getting emotional support from others.	Use of emotional support	0.39	-0.09	0.09	**0.60**	0.02	-0.04
23. I've been trying to get advice or help from other people about what to do.	Use of instrumental support	**0.43**	0.04	-0.01	**0.46**	0.34	0.00
22. I've been trying to find comfort in my religion or spiritual beliefs.	Religion	0.26	-0.06	-0.03	0.12	**0.78**	-0.02
27. I've been praying or meditating.	Religion	0.23	0.12	0.16	0.06	**0.64**	-0.05
11. I've been using alcohol or other drugs to help me get through it.	Substance use	-0.01	0.28	0.02	-0.02	0.04	**0.80**
4. I've been using alcohol or other drugs to make myself feel better.	Substance use	0.00	0.26	0.09	-0.06	-0.04	**0.73**
21. I've been expressing my negative feelings.	Venting	0.04	0.24	0.14	0.02	0.29	0.11
9. I've been saying things to let my unpleasant feelings escape.	Venting	0.04	0.40	0.21	0.21	0.10	0.03
Variance (%)		13.18	9.45	8.29	5.98	4.94	4.61

removed the first two items of the venting subscale but retained the last item of the active coping subscale in the "problem-solving", based on a consensus of the expert panel on the relevance in the Vietnamese culture and in the HIV population in this country. Therefore, the revised model identified that the EFA contained 26 items from the original Brief COPE consisting of six subscales.

CFA of the revised scale
The second CFA was conducted to assess the structure of the revised scale. The model fit of the 26-item, 6-factor revised scale was comparable to that of the 28-item, 14-factor original Brief COPE (Table 2).

Internal consistency

The overall Cronbach's alphas of the original and revised scales were 0.86 and 0.85, respectively, indicating a good internal consistency. However, Cronbach's alpha of the original Brief COPE ranged from 0.44 (active

coping) to 0.80 (substance use) for each subscale, whereas all the subscales of the revised scale showed good internal consistency with Cronbach's alpha > 0.7 (Table 4).

Convergent validity

The mean scores of each subscale of the revised scale were calculated in the depressed group and in the not depressed group for comparison (Table 5). The mean score of the "avoidance" and "substance use" subscales was significantly higher than that in the depressed group, whereas the mean scores of "problem-solving" and "social support" were significantly higher among those without depression. The Pearson correlation coefficients between the score of each subscale of the revised scale and MOS-SSS are shown in Table 6. The subscales of "problem-solving", "humor", "social support", and "religion" were positively associated with MOS-SSS, whereas the subscales of "avoidance" and "substance use" were negatively associated with MOS-SSS.

Table 4. Cronbach's alpha in the original and revised Brief COPE, overall and by subscale

	Original scale 28 items, 14 factors			Revised scale 26 items, 6 factors		
Subscales	No. of items	Cronbach's alpha		Subscales	No. of items	Cronbach's alpha
All	28	0.86		All	26	0.85
Self-distraction	2	0.50		Problem-solving	7	0.82
Active coping	2	0.44		Avoidance	7	0.75
Denial	2	0.72		Humor	4	0.82
Substance use	2	0.80		Social support	4	0.80
Use of emotional support	2	0.73		Religion	2	0.71
Use of instrumental support	2	0.67		Substance use	2	0.80
Behavioral disengagement	2	0.45		-	-	-
Venting	2	0.45		-	-	-
Positive reframing	2	0.50		-	-	-
Planning	2	0.73		-	-	-
Humor	2	0.63		-	-	-
Acceptance	2	0.69		-	-	-
Religion	2	0.71		-	-	-
Self-blame	2	0.74		-	-	-

Table 5. Comparison of the mean score of six subscales in the revised scale by depressed and not depressed group

	Depressed ($n = 150$) CES-D $\geq$ 16 Mean score $\pm$ SD	Not depressed ($n = 999$) CES-D < 16 Mean score $\pm$ SD	p value
Problem-solving	14.03 ± 4.58	15.93 ± 4.25	< 0.001[a]
Avoidance	7.71 ± 3.97	3.61 ± 3.88	< 0.001[a]
Humor	6.55 ± 2.83	6.89 ± 3.27	0.18[b]
Social support	6.76 ± 2.95	8.89 ± 2.68	< 0.001[a]
Religion	2.32 ± 2.00	2.14 ± 1.98	0.3[a]
Substance use	0.94 ± 1.43	0.33 ± 0.86	< 0.001[b]

CES-D: Center for Epidemiologic Studies Depression Scale. [a]Student t-test. [b]Welch t-test.

Table 6. Pearson correlation coefficients between the six subscales in the revised scale and MOS-SSS

	Mean (SD)	MOS-SSS
Problem-solving	15.70 (4.35)	0.38**
Avoidance	4.16 (4.13)	-0.21**
Humor	6.86 (3.22)	0.10**
Social support	8.63 (2.81)	0.60**
Religion	2.17 (1.99)	0.22**
Substance use	0.40 (0.97)	-0.12**

**$p < 0.01$. MOS-SSS, Medical Outcome Study Social Support Survey.

Discussion

In this study, we evaluated the psychometric properties of the Brief COPE among PLWHA receiving ART in one of the biggest HIV clinics in Vietnam. In the EFA, we found a revised 26-item version which had a six-factor structure consisting of "problem-solving", "avoidance", "humor", "social support", "religion", and "substance use". Even with fewer factor structures, the model fitness of the revised scale was comparable to that of the original Brief COPE. Further, the internal consistency of the revised scale was even better than that of the original

scale.

We found three items with factor loading < 0.4 in the EFA of the original Brief COPE. Among them, we removed two items which were related to *venting* negative feelings ("I've been expressing my negative feelings" and "I've been saying things to let my unpleasant feelings escape"), assuming a relatively small relevance for these two items in stress coping among Vietnamese HIV patients. Although over 90% of the participants reported that they had disclosed their HIV status to others (Table 1), only 12.4% had disclosed their status to a person outside family (data not shown). Therefore, it may be a fact that HIV patients cannot convey their emotions because of their small social network outside family and/or that they are afraid of their HIV status being disclosed by free expression. Another possible reason for the low factor loading of these two items might reflect a traditional value of self-control in the Vietnamese culture. In Vietnam, emotions are typically kept to oneself, whereas expressions of disagreement that may irritate or offend are avoided. There are also deep cultural restraints against showing "weakness" of the mind (*36*). Such tendencies might discourage their openness and venting negative feelings

to others. On the contrary, another item with factor loading < 0.4, one item of the active coping subscale ("I've been concentrating my efforts on doing something about the situation I'm in."), was retained in the revised scale considering its relevance in the Vietnamese cultural context. It also showed the highest factor loading of 0.37 on the "problem-solving" subscale, which seems to be conceptually rational.

In "problem-solving", both items from the acceptance, planning, and active coping subscales and one item from the positive reframing subscale were grouped together. It was similar to the findings from Carver's original factor analysis, which found that both items from the planning, active coping, and positive reframing subscales and one item from the acceptance subscale were loaded on a single factor. This could be explained by the fact that these subscales are all relevant to problem-focused coping, which explains all active efforts to manage or alter sources of stress.

Lazarus and Folkman presented three coping processes in their transactional model of stress and coping, primary appraisal and secondary appraisal, and coping (*1*). Primary appraisal is the process of perceiving a threat to oneself. Secondary appraisal involves people's evaluation of their resources and options for coping. Coping is the process of executing that response, which includes problem-focused coping and emotional-focused coping. Carver described that acceptance and planning are both related to the cognitive appraisal phase, whereas active coping, which is termed "problem-focused coping" by Lazarus and Folkman, occurs during the coping phase (*13*). According to their assessment, acceptance could occur in both primary and secondary appraisals; people accept a stressor as real in primary appraisal and the current absence of active coping strategies in secondary appraisal while attempting to deal with problems. Planning is defined as thinking about action strategies and how best to handle the problem, which occurs during the secondary appraisal. In addition, they explained that positive reframing intrinsically leads the person to continue active coping actions by construing a stressful transaction in positive terms. Therefore, clustering of the items from the above subscales is theoretically rationalized.

In contrast to "problem-solving", denial, self-blame, behavioral disengagement, and self-distraction were previously categorized in "dysfunctional" or "maladaptive" coping strategies (*24,37*) and loaded on a single factor, named "avoidance", in the EFA in our study. Similar clustering was found in other settings (*19,21,23*) including Carver's original factor analysis in which the items from the self-blame and denial subscales were loaded on a single factor (*12*). One article explained that denial and avoidance could be a common strategy of self-control in the Vietnamese. To avoid being overwhelmed by desperation, they often recognize the stressful situation using a special form of

rationalization: "destiny" (*36*). Furthermore, particularly in the HIV population, these coping strategies are often discussed in relation to the HIV-related stigma. For example, multiple stigmas experienced by PLWHA stem in part from the perception of HIV, whose transmission is often perceived to be caused by controllable behaviors that are not sanctioned by societal, religious, and moral codes. Such social stigma affects cognitions, emotions, and behaviors of individual PLWHA (*38*), including blaming themselves for the acquisition of HIV/AIDS (self-blame) (*39*), denial of the HIV status (denial) (*40*), and mental disengagement (self-distraction) (*41*), which might lead to giving up the attempt to attain goals with which the stressor is interfering (behavioral disengagement).

Both items from the humor subscale and one item from the self-distraction and positive reframing subscales were loaded on a single factor, which was named "humor" in this study. The conceptual explanations for the clustering of these items could be provided by published studies. A study suggested that positive humor is closely related to the reappraisal of the situation (*42*), which might help people look on the bright side of the negative event (positive reframing). Another suggested that humor may attenuate negative emotions as a result of cognitive distraction (self-distraction) (*43*). However, cultural rationalization for this factor should be further explored.

The "social support" factor consisted of both items from the use of instrumental support and of emotional support, as had occurred in other studies (*17,21*), including the original analysis of the COPE inventory (*13*) and the Brief COPE (*12*). Although Caver distinguished them as two separate factors considering that they are distinct conceptually (*13*), these two social support functions often co-occur. Similarly, both types of social support have been consistently observed in the HIV population in Vietnam, it promotes disclosure of HIV status to others and mental health in this population (*11,44,45*).

"Religion" and "substance use" formed independent factors, as in the original Brief COPE (*12*) and in other studies (*17,18,21*). Vietnam has many religions, which include folk religion, three main religions of Buddhism, Taoism, and Confucianism (called "tam giáo" in Vietnamese), and Catholicism. The religions provide a strong influence on the beliefs and practices in this country. Indeed, one study in Vietnamese caregivers of patients with dementia found that such a multi-faceted Vietnamese religious system provides a set of cultural resources in which they can manage personal suffering/distress, motivation for caregiving, and understanding the nature of illness itself (*46*). On the contrary, injection of drugs is a major route of HIV transmission in Vietnam (*5*). Accordingly, 19.4% of all participants (32.3% of the male participants) in this study reported a history of using drugs by injection. Substance use, including

injectable drugs, is strongly related to stress.

Our study revealed that "avoidance" and "substance use" known as "maladaptive coping strategies" (*37*) tended to be utilized in the individuals with depression (CES-D ≥ 16) and were negatively associated with the MOS-SSS score. On the contrary, factors known as "adaptive coping strategies" showed the opposite results; "problem-solving" and "social support" tended to be utilized in those without depression (CES-D < 16), and "problem-solving", "social support", "humor", and "religion" were positively associated with the MOS-SSS score. Furthermore, among six factors in the revised scale, "social support" showed the strongest correlation with MOS-SSS. The findings are consistent with evidence from previous studies (*11,27,47-50*) and support the new structure of the revised scale.

HIV-infected individuals need to manage various stresses, which could not only affect individuals' health including mental health and poorer adherence to ART (*9,10*), but also have negative social influences including increase in new infections and medial cost. To reduce the individual and social burden of stress, effective interventions should be developed based on the understanding of coping strategies adapted by HIV patients. With its simplicity, the Brief COPE is a practically useful tool for it. To our knowledge, this is the first study to psychometrically validate the Vietnamese version of the Brief COPE using a large sample of the HIV-infected population. However, this study has several limitations. First, this study was carried out on HIV patients who had been receiving ART for a relatively long time at a large HIV clinic. Their coping strategies may be different from those not receiving ART or those who just started ART. Therefore, the characteristics of the participants may not accurately represent Vietnam's entire HIV population. Second, although Cronbach's alpha of each revised subscale showed good internal consistency, we did not evaluate the other type of reliability, external consistency (*i.e.*, test-retest reliability and alternate form reliability). The reliability of the revised scale should be further investigated in future studies. Finally, a paucity of literature on stress coping in Vietnam may have not allowed us to fully examine the cultural aspects of the revised scale. Different modes of surveys including face-to-face interview may help in understanding better the coping mechanisms and strategies, which are specifically relevant in the HIV population living in Vietnam.

In conclusion, this study provided a revised version of the Brief COPE with a six-factor structure. This new structure was supported both culturally and theoretically for an assessment tool of coping strategies in the HIV population in Vietnam. Further research is needed to add on the psychometric evidence of this new factor structure in PLWHA and other Vietnamese populations.

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