ORIGINAL ARTICLE

Development and Validation of a Stressor-Coping Style Scale for Students in a Public Medical School

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ABSTRACT

Background. The medical curriculum is one of the most stressful academic curricula worldwide. Studies indicate that great levels of stress, that encompass academics to personal life, may be connected to a number of worrying statistics for the mental health of Philippine medical students.

Objectives. To develop a validated stressor-coping style scale for students in a public medical school.

Methods. The study employed a sequential mixed-methods design. An open-ended questionnaire was used to determine the common stressors and coping styles through convenience sampling. A scale was constructed from this data and was statistically tested for concurrent validity and reliability from a random sample.

Results. Following thematic analysis, an initial six stressor domains and eleven coping mechanisms were identified. However, after item analysis and principal component analysis of responses, the scale was transformed to seven stressor domains and five coping mechanism domains. All of which are deemed internally consistent ($\alpha>0.6$). Scores from the scale were also convergent with the scores of Brief COPE ($r=0.5$ to 0.9).

Conclusions. The developed stressor-coping style scale for medical students is a reliable and valid tool for Filipino medical students in a public medical school.

Keywords: coping, stressors, scale development, medical students

INTRODUCTION

The medical curriculum is reported to be one of the most stressful academic curricula worldwide.[1] Medical students face different stressors encompassing their academics and personal lives. Prominent stressors include frequency of examinations, the academic curriculum, information overload, pressures of work, high parental expectations, peer pressure, lack of leisure time, and financial problems.[2-4] In the Philippines, the stress of medical education has shown to be beyond academic demands. Notably, Guinto[5] cited weaknesses in the physician training in the country where medical students expressed a lack of exposure to communities they are expected to serve, leadership and management opportunities, and social determinants to health despite being expected to be leaders in primary healthcare. As medical schools adapt to creating curricula to address these concerns, the University

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of the Philippines College of Medicine (UPCM) is one of the pioneers in innovating medical education to achieve this goal.[6] Thus, students from the UPCM undergo novel experiences as they navigate such programs.

These heightened stress levels appear to be connected to a number of worrying statistics on the mental health of medical students, as studies indicate. It was noted that 50% and 30% of respondents from seven different US-based medical schools experienced burnout and common mental disorders, respectively.[7] Some studies of medical students determined that almost 6% and 21% of the medical students surveyed experience suicidal ideation and probable major/moderate depression, respectively.[8,9] Despite the prevalence of such mental issues, it is quite alarming to note that only 13% of medical students having such issues sought treatment.[8]

Several scales have been made to measure and describe the impact of stress and the corresponding coping mechanisms we employ to address it.[2,10-13] Due to the prevalent effects of stress on medical students, studies constructing coping scales as well as correlating stress and its effects have been conducted in several countries including, the Ways of Coping Scale by Folkmann and Lazarus,[12] the Coping Inventory for Stressful Situations,[13] the Ways of Coping Checklist (WCCL),[10] Medical Students' Stressor Questionnaire (MSSQ-40),[1] and the Coping Strategies Inventory (CSI)[11] given to medical students from India, Japan, and USA. Another notable example, The COPE Inventory used for measuring coping styles, has been widely used and tested among batches of medical students from different nationalities. This has already been translated into a number of languages such as French, Chinese, and Spanish. A short form of COPE was used in studies based in Hong Kong,[14] Germany,[15] and Nepal[16] to samples of medical students.

This interest in research exploring the stressors and coping styles of medical students has not been seen in the local Philippine context. A PubMed search with the relevant terms showed that there have been no similar studies done in the Philippine context. Filipino medical students could have stressors, coping styles, and behavior unique to their Western and Asian counterparts. Hence, applying an unadapted foreign scale on a Filipino population does not ensure valid results.[17-19] There is a need to conduct a study that aims to make a coping style inventory fitted to the local context, specifically for Filipino medical students from a public medical school.

In line with this local context, the purpose of the study is to construct a valid and reliable scale that measures how medical students from various year levels cope in response to stressors they experience in medical school. More specifically, the study aims to identify common stressors and coping mechanisms among medical students, and construct a psychometrically sound scale for stressor-coping style. Thus, results from the scale can be used as a basis for providing interventions to students who may be predisposed to depression, anxiety, or other mental health conditions as suggested in other researches.[4] Such interventions could include holding workshops on adaptive coping strategies or enrolling the students under the guidance of mentors, as is currently done in a public medical school.[20]

METHODS

Study Design

The study is a sequential mixed methods study, following an exploratory design with qualitative data collection through an open-ended questionnaire (Phase 1) preceding the quantitative scale (Phase 2). The qualitative portion included online open-ended surveys and the quantitative portion included validity and reliability testing, finalization, and norm formulation of the scale. The study area was the College of Medicine, University of the Philippines Manila wherein its medical students serve in the Philippine General Hospital, the national referral center catering to 600,000 patients per year.

Participants and Sampling

Students qualified for the quantitative portion of the study satisfied the following criteria: (1) a medical student currently enrolled in the Doctor of Medicine program in the University of the Philippines Manila, and (2) must be within their first year to fifth year in the program (AY 2016-2017).

The researchers of the study, along with students with absence without leave (AWOL) or leave of absence (LOA) status were not included in the sample. Sekaran and Bougie[21] proposed using a minimum of 30 samples per category of respondents for most research. Hence, for the qualitative part (Phase 1) of the study, 150 respondents were targeted via convenience sampling. Theoretical saturation, where no more new ideas are being introduced as respondents are added to the study, is the benchmark for sampling adequacy in qualitative research.[21] This was achieved in the first part of the study. Thus, it was deemed that the 154 respondents for the first part of the study is sufficient.

Streiner[22] notes that there is a need for at least five respondents per item measured, or 100 respondents, whichever is higher, in a quantitative survey for factor analysis. In the stressor scale, 100 respondents will be needed for the 20 variables in that part of the survey. In the brief COPE scale, 140 respondents will be needed for the 28 variables in that part of the survey. In the coping mechanism scale, 185 respondents will be needed for the 37 variables in that part of the survey. Since the largest of the three values is 185, 185 respondents will be used for the second part of the study or 37 respondents from each of the first to the fifth year of the program. Using an attrition rate of 30%, at least 37/(1-0.3) or 52 respondents needed to be contacted per year level in order to achieve the said number of respondents. More respondents were randomly selected to account for the higher attrition than expected. In the end, 176 respondents answered the second part of the study out of the 327 possible respondents contacted, with a 46.1% attrition rate.

The first phase of the study was done on February to March 2017, while the second phase was done from April to May 2017. For the participant recruitment, the team of researchers were divided and assigned with a Learning Unit level where they would disseminate the survey. The researchers primarily used social media network messaging to contact and follow up the participants.

Ethical Considerations

Ethical approval required to undertake this study was granted by the UPM Review Ethics Board. The informed consent of the participants were also obtained. They were informed about the purpose and risks of the research and were assured of their right to refuse participation or to withdraw from the study at any point. The anonymity and confidentiality of the participants were also guaranteed by assigning serial participant codes. The raw data was stored in Excel files exported from the electronic survey platforms. These and other associated files kept in a secure cloud file storage service, Google Drive, which was only accessible to permissioned users.

Item Construction and Contextualization

An online open-ended questionnaire, powered by Typeform was utilized to collect qualitative statements used to guide the construction of test items. The questionnaire, which used purely English, asked the students to enumerate at least five stressors they are experiencing, their respective coping mechanisms per stressor, and their perceived desirability of each coping mechanism.

From this data, the different subscales for stressor and coping style, as well as the individual items for each, were determined through thematic analysis by two of the investigators. Using a spreadsheet, the data was divided by year level for the coping and stressor data sets, for each year level, two researchers were co-assigned to collaborate and reach a consensus in grouping similar or synonymous data entries together under an encompassing term. For instance, "exam," "quizzes," and "tests" were grouped under one term: "exams." Furthermore, the frequency of related terms was added together and tabulated. Categories with their respective item/terms were then generated, and in some instances similar categories and their items were merged. For example, the "extracurricular" coping category was merged with the "hobbies" coping category due to the similarities of the items of the two subscales. Also, low frequency items were removed on a case-to-case basis since total frequencies between categories greatly varied. Through this process, the raw qualitative data was transformed and organized into specific categories that would constitute as the basis of the items and their associated subscales of the stress coping scale.

This process allowed the production of the actual scale for statistical testing. For each item in the stressor scale, respondents were instructed to rate the frequency in which they experience stress when faced with a source of stress on a four-point Likert scale (Never, Sometimes, Often, Always). Meanwhile, in the coping mechanisms scale, respondents were instructed to rate the frequency in which they respond to a particular stressor domain on a four-point Likert scale presented as a matrix.

Subsequent pilot testing focused only on the construction of the questionnaire. Each of the participants, after answering the survey itself, was asked for comments on the different qualitative aspects of the scale (i.e., item construction and content, formatting, aesthetics, test fatigue) to improve scale quality. The main criteria of qualitative assessment were: a) comprehensibility (or wording), b) understandability, c) relatability, and d) relevance to the context.

Item Analysis: Reliability and Validity Testing

Pilot testing consisted of administering the constructed quantitative scale to a stratified sample of the public medical school's student population. The survey disseminated had four parts. First, participants were asked to provide demographic data about themselves. The second part asked participants regarding how often they experience a stressor. The third part asked about the frequency of use of specific coping styles in response to a generalized category of stressors. Lastly, participants were asked to answer the 28-item Brief COPE[23] scale that was used for validity testing. For this set of tests, English was used for all the items and instructions.

Statistical Package for the Social Sciences (SPSS) was used to analyze the scale's reliability and validity. Item-total correlation was initially done to Cronbach's Alpha was the gauge for internal consistency of the items of our scale–with a target alpha range of 0.6-0.8.[24] This value was improved by employing item analysis and performing measures to check for the necessity of each item in the scale. First of these item analysis measures involved looking at item-total correlations and any item that fell below 0.4 was reevaluated and/or removed. Principal component analysis was done to verify construct validity of themes identified. Concurrent validity of the constructed scale was done by correlating coping mechanism domain scores with the Brief COPE[23] through Pearson R correlation. The Brief COPE is a 28-item scale used to measure coping styles of respondents. It is published and widely-used, and has been tested among different nationalities.

RESULTS

Data was collected from a total of 154 and 176 participants from the five different years levels of UPCM for the first and second phase, respectively. Table 1 shows a breakdown of participants per year level for the two phases.

Phase 1

There were over 800 stressors and coping mechanisms identified by the 154 participants in the public medical school. From these, a total of six stressor domains were formulated

from the thematic analysis. The final six domains were academic-related, hospital-related extracurricular-related, environment-related, social/relational-related, and personal/well-being-related. Table 2 shows a summary of the domains and examples cited by the participants. A total of 20 items were formed for the stressor scale.

A total of eleven coping style domains were also derived namely, physical/physiologic management, social/relational, spiritual/religious, planful problem solving, active problem solving, cognitive reframing and reorientation, acceptance and passivity, emotional release and handicapping, overt escape/avoidance, recreational consumption, and recreational practice/expression with a total of 40 items constructed. However, upon review there were only three qualitative responses that related to spiritual/religious coping, thus it was removed. Table 3 summarizes the coping mechanisms domains and examples from the open-ended questionnaire.

Phase 2

Item total correlation and Cronbach α were computed to identify good items (R ≥ 0.40) and domains (α ≥ 0.60).

Table 1. Learning Unit Participant Level Breakdown per Phase

Learning Unit Level	Phase 1	Phase 2
III	32	41
IV	35	32
V	37	36
VI	30	36
VII	20	31
Total	154	176

Table 2 shows a summary of the item total correlations of the identified items and Cronbach alpha of the stressor domains while Table 2 shows the same for the coping mechanisms domain. Out of the 20 stressor items constructed, only two were identified as having poor item-total correlation (S9 and S15), while 11 out of 37 items were poor in the coping mechanism scale (C2, C4, C6, C14, C19, C29, C33, C34, C35, C36, C37). Moreover, Recreational Consumption and Recreational Practice/Expression had poor internal consistency.

There were no negative comments regarding the comprehensibility, understandability, relatability, and relevance to the context of the items constructed and the form of the scale per selected pilot test participants. However, due to the low internal consistency of the Recreational Consumption and Recreational Practice/Expression domains in the coping mechanisms scale, the investigators removed the items associated with the domains for the principal component analysis summarized on Tables 2 and 3. Poor items associated with good domains were retained.

Principal Component Analysis was done on both stressor and coping mechanism scales which followed the Kaiser Criterion and was done with a Varimax rotation procedure. Domains with eigenvalues > 1 were retained while items with factor loadings > 0.4 were retained. For the stressor scale, the initial six themes were expanded to seven with most items loading to their original domains. Interestingly, items S9, S19, and S20 loaded into a new domain which the investigators decided to call Demands as it related to the stress of demands imposed by one's self and others. All domains from the principal component analysis of the stressor scale had

Table 2. Item-Total Correlation and Domain Reliability (Stressor)

Stressor Domain	Code	Stressor Item	R	Good/Poor
Academic-Related	S1	Academic workload and demand	0.539	Good
α = 0.706	S2	Exams (i.e., before, during, and after)	0.647	Good
	S3	Research work	0.404	Good
Hospital-Related	S4	Hospital system (e.g., inefficiencies, lack of personnel)	0.706	Good
α = 0.843	S5	Hospital workload (e.g., duty hours, difficult rotations)	0.788	Good
	S6	Patients (e.g., uncooperative patients, financially-burdened patients)	0.676	Good
Extracurricular-Related	S7	Affiliation work (e.g., organization, fraternity, sorority)	0.663	Good
α = 0.693	S8	Extracurricular activities	0.621	Good
α = 0.861 if S9 is deleted	S9	Lack of time to pursue other hobbies and interests	0.292	Poor
Environment-Related	S10	Living conditions (e.g., finances, place of residence, transportation)	0.466	Good
α = 0.678	S11	School facilities (e.g., accessibility, availability, quality)	0.535	Good
	S12	News and happenings (i.e., local, national, and international)	0.473	Good
Social/Relational-Related	S13	Family	0.564	Good
α = 0.676	S14	Friends	0.607	Good
α = 0.728 if S15 is deleted	S15	Significant other	0.296	Poor
	S16	Coworkers (e.g., groupmates, clerks, interns, residents, nurses)	0.409	Good
Personal/Well-Being-Related	S17	Physiologic health issues	0.443	Good
α = 0.745	S18	Mental health issues	0.548	Good
	S19	Expectations of myself	0.637	Good
	S20	Others' expectations of me	0.537	Good

acceptable levels of internal consistency (α = 0.655 - 0.863). Table 4 shows a summary of the principal component analysis done for the stressor scale.

On the other hand, the coping mechanisms scale yielded fewer domains as compared to the original themes identified that had good internal consistency. Majority of the items loaded under Constructive Approach which contained items from Active Problem Solving, Planful Problem Solving, Cognitive Reframing and Reorientation, and Physical/Physiologic Management. Overt Avoidance, Passive Acceptance, and Social Support retained most of its initial items, however the Emotional Release and Handicapping domain was named as Negative Emotionality to better capture the items that loaded onto it. Table 5 shows the principal components analysis for the coping mechanism scale.

All domains had good internal consistency (α = 0.835 – 0.941). Internal consistency of domains may be improved by increasing stringency of cut-off values for items to be included in the scale, however all Cronbach's Alpha values are within acceptable levels.

Concurrent validity was derived from correlating the coping mechanism scale with the Brief COPE.[21] All domains of the coping mechanism scale had relatively weak but significant correlations with at least one Brief COPE

Table 3. Item-Total Correlation and Domain Reliability (Coping Mechanisms)

Coping Mechanism Domain	Code	Coping Mechanism Item	R	Good/Poor
Physical/ Physiologic Management ***α = 0.593*** ***α = 0.691 if C2 was deleted***	C1	Eat	0.495	Good
	C2	Substance Use (e.g., alcohol, smoking)	0.108	Poor
	C3	Nap and/or sleep	0.537	Good
	C4	Self-care (e.g., exercise, medication) and/or self-pampering (e.g., massage, spa)	0.385	Poor
Social/ Relational ***α = 0.435*** ***α = 0.777 if C6 is deleted***	C5	Talk with others (e.g.. family, friends) about others	0.417	Good
	C6	Keep to myself (i.e., isolation) **	-0.245	Poor
	C7	Spend time with others (e.g., family, friends)	0.492	Good
	C8	Asking others (e.g., family, friends) for help/advice	0.527	Good
Planful Problem-Solving ***α = 0.896***	C9	Plan actions/solutions ahead	0.820	Good
	C10	Strategize (i.e., find most efficient solution, weigh cost and benefits)	0.852	Good
	C11	Assess needs of situation and adapt accordingly	0.717	Good
Active Problem-Solving ***α = 0.757*** ***α = 0.914 if C14 is deleted***	C12	Prioritize and focus on addressing problem	0.721	Good
	C13	Find and implement solutions to problem	0.712	Good
	C14	Just do what has to be done	0.371	Poor
Cognitive Reframing and Reorientation ***α = 0.806***	C15	Directed self-reflection and reevaluation (i.e., in terms of dealing with stressor: e.g., self-assurance, self-blame, social comparison)	0.637	Good
	C16	Dispositional adjustment (e.g., extend patience, push yourself, have proper mindset, self-motivation, pessimism)	0.660	Good
	C17	Perspective change (i.e., try to see things differently)	0.697	Good
	C18	Positive thinking	0.512	Good
Acceptance and Passivity ***α = 0.702*** ***α = 0.717 if C19 was deleted***	C19	Accept reality of situation	0.350	Poor
	C20	Rationalize (i.e., justify existence of situation)	0.469	Good
	C21	Tolerate problem	0.557	Good
	C22	Just go with the flow	0.583	Good
Emotional Release and Handicapping ***α = 0.844***	C23	Cry	0.640	Good
	C24	Breakdown	0.763	Good
	C25	Panic	0.685	Good
	C26	Hopelessness and Helplessness	0.641	Good
Overt Escape/Avoidance ***α = 0.792*** ***α = 0.806 if C29 is deleted***	C27	Avoid Problem	0.678	Good
	C28	Detachment and disinterest	0.618	Good
	C29	Procrastinate	0.398	Poor
	C30	Denial (i.e., of existence of problem)	0.567	Good
	C31	Divert attention to other things instead	0.618	Good
Recreational Consumption ***α = 0.539*** ***α = 0.444 if C33 and C34 are deleted***	C32	Watch movies/series/shows	0.444	Good
	C33	Surfing the net (e.g., YouTube, social media)	0.371	Poor
	C34	Video/computer games	0.250	Poor
Recreational Practice/ Expression ***α = 0.323***	C35	Sports and/or e-sports (e.g., MOBAs, MMORPGs, tournaments)	0.090	Poor
	C36	Arts and creative expression (e.g., painting, writing, dancing, music)	0.215	Poor
	C37	Other unique/miscellaneous hobbies (e.g., blogging, collecting)	0.254	Poor

Table 4. Principal Component Analysis & Cronbach's Alpha (Stressors)

Code	Stressor Item	Rotated Components						
		Hospital	Social	Environment	Demands	Academic	Well-Being	Extra-curricular
S5	Hospital workload	**0.888**	0.000	0.010	0.029	-0.022	0.150	-0.091
S4	Hospital system	**0.851**	-0.000	0.116	-0.017	-0.088	-0.058	-0.101
S6	Patients	**0.825**	0.105	-0.086	0.099	0.038	0.038	-0.046
S13	Family	0.019	**0.838**	0.119	0.171	0.005	0.107	0.040
S14	Friends	-0.056	**0.817**	0.195	0.131	0.005	0.155	0.088
S16	Coworkers	0.335	**0.542**	0.035	0.078	0.113	0.163	0.147
S11	School facilities	0.218	0.143	**0.806**	0.030	0.126	-0.005	0.014
S12	News and happenings	-0.076	0.057	**0.752**	0.155	0.020	0.061	0.089
S10	Living conditions	-0.141	0.221	**0.637**	-0.057	0.149	0.241	0.182
S20	Others' expectations of me	0.032	0.262	0.017	**0.831**	0.203	0.065	0.021
S19	Expectation of myself	0.022	0.214	0.047	**0.822**	0.119	0.142	0.209
S9	Lack of time to pursue other hobbies and interests	0.161	-0.190	0.421	**0.540**	0.073	0.146	0.171
S2	Exams	0.020	0.021	0.093	0.070	**0.868**	0.029	0.172
S1	Academic workload and demand	0.078	0.020	0.042	0.162	**0.761**	0.094	0.237
S3	Research work	-0.196	0.075	0.155	0.125	**0.658**	0.212	-0.170
S17	Physiologic health issues	0.122	0.099	0.156	0.150	0.034	**0.821**	0.034
S18	Mental health issues	0.057	0.104	0.172	0.309	0.147	**0.754**	0.100
S15	Significant other	-0.022	0.314	-0.068	-0.150	0.179	**0.552**	0.112
S7	Affiliation work	-0.140	0.109	0.094	0.212	0.123	0.051	**0.880**
S8	Extracurricular activities	-0.103	0.126	0.177	0.075	0.130	0.144	**0.857**
Eigenvalues		**4.828**	**2.673**	**1.620**	**1.469**	**1.330**	**1.160**	**1.076**
% of Variance		**24.138**	**13.636**	**8.101**	**7.347**	**6.651**	**5.800**	**5.378**
Cronbach's α		**0.863**	**0.722**	**0.678**	**0.732**	**0.707**	**0.655**	**0.861**

subscale. Table 6 summarizes the correlation of the Coping Mechanisms scale with the Brief COPE.

Notably, the Humor subscale in the Brief COPE did not correlate with any of the coping mechanisms domains. This is expected as there were no items in the scale that related to using humor as a way to cope with stress. Moreover, the Passive Acceptance domain only had a significant relationship with the Self-blame subscale and no relationship with conceptually similar subscales such as Behavioral Disengagement and Acceptance.

DISCUSSION

The current research demonstrates the multi-staged nature of test development in order to ensure sound psychometric properties. Phase 1 of the study yielded an exhaustive amount of stressors and coping mechanisms from medical students in a public medical school. This together with literature review served as evidence of content validity of the questions constructed in the scales developed.[25] Face validity was further established by asking questions on the readability of the questions. However, the themes identified in Phase 1 were altered when principal component analysis was done in Phase 2. This was necessary to establish an empirical evidence of construct validity wherein if some subscales are valid, or if the constructed test measured a unidimensional construct.[26]

Expansion of the stressor subscales are still consistent with literature as previous studies have demonstrated that expectations or demands imposed by the self and others is a significant source of stress among students[27-30] that is separate from that of academic workload[28]. As medical students, they must not only fulfill tasks, but the role of a student[31] especially in changing times[32]. Variety in the questions under each stress subscale however may not be able to conform to classifications of eustress and distress, as such it is best to name the scale a stressor domain[33] that aims to characterize the source of stress. Furthermore, reduction of the coping mechanisms subscales has simplified the rationale for each subscale, with most of them being cognitive in nature, although there are behavioral questions embedded in the subscales.

Concurrent validity of the stressor scale was not established due to the absence of an existing stressor identification scale to compare the developed tool. However, the coping mechanism subscales correlated significantly with multiple components of the Brief COPE questionnaire.

Having a coping mechanism scale validated for a Filipino medical population will enable the efficacy of studies on interventions aimed at improving coping mechanisms to deal with stressors that Filipino medical students face to be more accurately quantified as the coping mechanism scale that is used is validated for the Filipino medical student population, just as the Brief COPE is used in order to quantify interventions aimed at improving coping mechanisms to

Table 5. Principal Component Analysis and Cronbach's Alpha (Coping Mechanism)

Code	Coping Mechanism Item	Rotated Component Loadings				
		Constructive Approach	Overt Avoidance	Negative Emotionality	Passive Acceptance	Social Support
C12	Prioritize and focus on addressing problem	**0.878**	0.089	0.078	0.118	0.132
C13	Find and implement solutions to problem	**0.869**	0.053	0.121	0.082	0.185
C10	Strategize	**0.864**	0.112	0.041	0.014	0.246
C9	Plan actions/solutions ahead	**0.839**	0.099	0.050	0.014	0.248
C11	Assess needs of situation and adopt accordingly	**0.839**	0.185	-0.056	0.112	0.156
C15	Directed self-reflection and reevaluation	**0.759**	0.068	0.238	0.363	-0.023
C16	Dispositional adjustment	**0.696**	0.132	0.138	0.482	0.096
C17	Perspective change	**0.673**	0.058	0.042	0.413	0.073
C18	Positive thinking	**0.609**	-0.051	-0.150	0.349	0.267
C1	Eat	**0.513**	0.124	0.257	0.223	0.280
C3	Nap and/or sleep	**0.509**	0.292	0.308	0.266	0.263
C4	Self-care and/or self-pampering	**0.451**	0.230	0.276	0.040	0.370
C28	Detachment and disinterest	0.052	**0.763**	0.201	0.195	0.028
C30	Denial	0.121	**0.751**	0.126	0.148	0.009
C27	Avoid problem	-0.020	**0.706**	0.227	0.279	0.182
C31	Divert attention to other things instead	0.013	**0.656**	0.178	0.332	0.167
C2	Substance use	0.161	**0.531**	0.041	-0.043	0.011
C29	Procrastinate	0.223	**0.528**	0.321	0.249	0.052
C24	Breakdown	0.089	0.195	**0.851**	0.020	0.133
C23	Cry	0.090	0.055	**0.811**	0.195	0.101
C25	Panic	0.079	0.250	**0.781**	0.049	0.156
C26	Hopelessness and helplessness	-0.008	0.446	**0.676**	0.046	0.056
C6	Keep to myself	0.309	0.336	**0.441**	0.355	-0.241
C22	Just go with the flow	0.134	0.354	0.056	**0.764**	0.101
C21	Tolerate problem	0.137	0.308	0.063	**0.741**	0.089
C19	Accept reality of situation	0.476	0.056	0.141	**0.578**	0.207
C20	Rationalize	0.314	0.290	0.268	**0.551**	0.092
C14	Just do what has to be done	0.488	0.126	0.101	**0.550**	0.153
C7	Spend time with others	0.346	0.134	0.053	0.167	**0.778**
C8	Asking others	0.415	0.113	0.159	0.083	**0.747**
C5	Talk with others	0.383	0.024	0.243	0.185	**0.697**
Eigenvalues		**12.072**	**3.998**	**1.970**	**1.337**	**1.185**
% of Variance		**38.942**	**12.898**	**6.356**	**4.313**	**3.821**
Cronbach's α		**0.941**	**0.835**	**0.860**	**0.853**	**0.858**

Table 6. Correlation of Coping Mechanisms with Brief COPE

Component Correlation	Constructive Approach	Overt Avoidance	Negative Emotionality	Passive Acceptance	Social Support
Self-distraction	0.059	**0.269***	**0.172***	0.127	0.033
Active coping	**0.259***	**-0.285***	**-0.220***	-0.000	0.094
Denial	0.008	**0.363***	**0.349***	-0.000	0.083
Substance use	0.021	**0.319***	0.133	-0.006	0.035
Use of emotional support	0.146	-0.064	0.024	-0.013	**0.362***
Use of informational support	**0.226***	0.039	0.038	0.027	**0.362***
Behavioral disengagement	-0.088	**0.339***	**0.399***	-0.001	-0.004
Venting	0.041	**0.198***	**0.177***	0.188	**0.202***
Positive reframing	**0.311***	-0.121	**-0.154***	0.089	0.132
Planning	**0.307***	-0.124	-0.094	0.064	0.062
Humor	0.026	0.086	-0.136	0.036	0.027
Acceptance	**0.170***	-0.001	0.085	0.130	0.016
Religion	**0.263***	-0.123	-0.088	0.066	**0.169***
Self-blame	**0.217***	**0.358***	**0.468***	**0.293***	0.136

**significant P value <0.05*

deal with stressors that other medical students from different countries face.[34,35] It could also be used to advocate for the research on better interventions for improving coping mechanisms of the Filipino medical student population, just like the study by Datar, Shetty and Napahde in India.[36]

CONCLUSIONS AND RECOMMENDATIONS

The current study aimed to construct a stressor-coping scale for students enrolled in a public medical school. Phase 1 of the study consisted of open-ended questionnaires that yielded over 800 stressors and coping strategies. From these, test items were constructed under each theme identified using examples cited in the open-ended questionnaire responses which ensured content validity. Phase 2 showed that there were two identified domains that had low internal consistency and were removed before conducting principal component analysis. Overall, the constructed stressor-coping scale has acceptable levels of internal consistency, while the coping mechanism scale has significant relationships with the Brief COPE subscales implying good concurrent validity.

Despite its strengths, the current tool has its limitations partly due to resource constraints. First, its lack of evidence for test-retest reliability which can show the time-bound stability of the domains being measured. Second, the study sample was limited to one medical school, thus there may be aspects in other medical schools that are not represented in the scale. Third, the study sample was limited due to the attrition rate of participants, which may be in large due to participant fatigue in answering the large set of the original set of items.

Given these limitations, a few recommendations can be made for succeeding studies. The inclusion of a more diverse sample of medical students from Philippine medical schools may be instrumental in assuring the representativeness of the scale. Norming of the scale, to allow more utility in the interpretation of test scores can also be undertaken by future studies. Also, exploring other survey options and streamlining the electronic survey format of the scale to allow easier answering of participants may lessen attrition rate of the survey dissemination. Incentive systems and other similar strategies may also be considered. Finally, the creation of a Filipino language version of the scale can also be explored.

In terms of potential future uses and directions after the scale is further refined, this is recommended to be potentially used by public medical school administrators to identify and monitor stress and coping levels of enrolled medical students. Data from which may be useful in constructing and/or revising student well-being programs. It may also be worthwhile to investigate the validity of the current tool to other contexts such as private medical schools, or trainees in residency and fellowship. Future studies may also consider testing the scale with other student populations in healthcare professions (nurses, therapists etc.). Differences of stressors and coping mechanisms used across different stages of medical school and training may also be investigated using the tool. It is also recommended for future investigators to keep de-identified data from responses of medical students for the continual improvement of the scale in changing times, such that of constructing a short form.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

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