REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ORGANIZATION.

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
10/17/2017	Abstract	

4. TITLE AND SUBTITLE
A Shortened Stress Measure in Military Nursing Personnel

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Lt Col Hernandez, Stephen

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
59th Clinical Research Division
1100 Willford Hall Loop, Bldg 4430
JBSA-Lackland, TX 78236-9908
210-292-7141

8. PERFORMING ORGANIZATION REPORT NUMBER
17456

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
59th Clinical Research Division
1100 Willford Hall Loop, Bldg 4430
JBSA-Lackland, TX 78236-9908
210-292-7141

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release. Distribution is unlimited.

13. SUPPLEMENTARY NOTES
Military Psychology

14. ABSTRACT

A Shortened Stress Measure with Military Nursing Personnel
Abstract
Stress is a psychological construct with important consequences for human health. A substantial number of stress measures are available that vary in length and dimensionality. The purpose of this study was to determine whether one of these measures, the Perceived Stress Questionnaire (PSQ), could be shortened in a psychometrically sound fashion to enhance its usability. The original PSQ has 30 items, and, more recently, a 20-item version was proposed. We used existing data from Air Force nursing personnel (n = 250) to shorten the PSQ through a combination of classical test theory and item response theory techniques. The resulting six-item measure, the PSQ6, had scale scores that correlated highly with PSQ30 and PSQ20 scale scores (intraclass correlation coefficient = .92), strong internal consistency (Cronbach's α = .85), and associations with stigma, perceived barriers, and resilience scale scores that were similar in strength to longer versions of the PSQ.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Clarice Longoria
			UU		19b. TELEPHONE NUMBER *(Include area code)* 210-292-7141

A Shortened Stress Measure with Military Nursing Personnel

Abstract

Stress is a psychological construct with important consequences for human health. A substantial number of stress measures are available that vary in length and dimensionality. The purpose of this study was to determine whether one of these measures, the Perceived Stress Questionnaire (PSQ), could be shortened in a psychometrically sound fashion to enhance its usability. The original PSQ has 30 items, and, more recently, a 20-item version was proposed. We used existing data from Air Force nursing personnel (n = 250) to shorten the PSQ through a combination of classical test theory and item response theory techniques. The resulting six-item measure, the PSQ6, had scale scores that correlated highly with PSQ30 and PSQ20 scale scores (intraclass correlation coefficient = .92), strong internal consistency (Cronbach's α = .85), and associations with stigma, perceived barriers, and resilience scale scores that were similar in strength to longer versions of the PSQ.

Keywords: psychological stress, psychometrics, military personnel

The views expressed are those of the authors and do not reflect the official views or policy of the Department of Defense or its components. The voluntary, fully informed consent of the subjects used in this research was obtained as required by 32 CFR 2019 and DODI 3216.02_AFI 40-402.

Throughout what is now the longest period of ongoing warfare in U.S. history, "extraordinary demands and stressors" (Institute of Medicine, 2014, p. 9) have been placed on the service members of the U.S. military. The demand for mental health services is high, and service members' beliefs about their ability to cope with stress sometimes affects their attitudes and decisions about seeking treatment (Langston et al., 2010). Manifestations of stress from a deployment include "increased divorce rates, spouse and child abuse, mental distress, substance abuse—but one of the most troubling manifestations is suicides" (Ramchand, Acosta, Burns, Jaycox, & Pernin, 2011, p. xiii). Service members may avoid or delay seeking treatment out of reluctance to admit they may be having difficulties due to work- or family-related stress (Britt et al., 2011). Rigorously and pragmatically assessing levels of occupational stress and, relatedly, tailoring interventions for stress for military personnel are urgent issues.

Measuring Stress

The Perceived Stress Questionnaire (PSQ) is a 30-item instrument that was developed to measure general or recent stressors in clinical psychosomatic research (Levenstein et al., 1993). Compared with other stress scales, the PSQ allows an individual to express a response to stressful items that are "abstract enough to be applicable to adults of any age, stage of life, sex, or occupation [and] specific to a variety of real-life situations" (Fliege et al., 2005, p. 78). Although Fliege et al. (2005) tested a shortened 20-item version of the PSQ, a truly pragmatic version of the PSQ does not currently exist. According to Glasgow and Riley (2013), such a pragmatic stress measure would need to have the minimum properties of being important to stakeholders, low burden, actionable, and sensitive to change. In particular, Glasgow and Riley recommended that a pragmatic measure should "take no longer than 2 minutes for the typical

respondent to complete" (p. 239). According to Fliege et al., the 20-item PSQ takes slightly less than 5 minutes to complete.

The general prompt for the PSQ, used in the current study, asks respondents to rate experiences within the last year or two on a 4-point scale ranging from *almost never* to *usually* (Levenstein et al., 1993). Details about the PSQ's internal consistency reliability, test-retest reliability, convergent validity, criterion validity, construct validity, and sensitivity to change can be found, for example, in Levenstein et al. (1993), Fliege et al. (2005), and Kocalevent et al. (2007) and reflect generally strong psychometric properties. In the study by Levenstein et al., in particular, the PSQ scale score had strong positive correlations with trait anxiety (r = .69), somatic symptoms (r = .50), and Cohen's Perceived Stress Scale (r = .56; Cohen, Kamarck, & Mermelstein, 1983).

Stress in Military Nursing Personnel

Two recent articles used the PSQ to measure perceived levels of stress experienced by active component, Air Force registered nurses and medical technicians (Author, 2016, 2017). Findings showed that 44% of Air Force nursing personnel reported a stress or emotional problem at the time of the study and that higher levels of stress were associated with higher levels of stigma about seeking mental health services and lower resilience (Author, 2016). Additionally, there was a moderate-strength positive association between PSQ scores and having sought treatment in the previous 6 months (Author, 2017). The current study sought to develop a shortened version of the PSQ using the source data for the previous two articles (Author, 2016, 2017). We hypothesized that this shortened stress instrument could reliably replicate those findings.

Methods

Sampling and Measures

An anonymous electronic survey was e-mailed to approximately 1,400 active component Air Force nursing personnel across three study sites from October 2014 to April 2015, resulting in 250 responses (Author, 2016, 2017). The survey included 30 items from the PSQ (Levenstein et al., 1993), six Stigma and five Barriers items from scales present in Hoge's Perceived Barriers items (Hoge et al., 2004; Kim, Britt, Klocko, Riviere, & Adler, 2011), 25 items from the Connor-Davidson Resilience Scale (Connor & Davidson, 2003), and a dichotomous item on treatment-seeking in the last 6 months that was asked of respondents who indicated that they were "currently experiencing a stress or emotional problem." Details about items, response options, scoring, reliability, and validity for these survey scales can be found in Author (2016) along with descriptive statistics for these scales and demographic characteristics of the sample. Briefly, 64% of respondents were female, 78% were White, 9% were Hispanic, 56% were officers, and more than half (n = 141; 56%) had been deployed since September 11, 2001 (Author, 2016). Of the 117 respondents in this sample who reported a current stress or emotional problem, only about one quarter (n = 32; 27%) reported seeking mental health treatment (Author, 2017).

Data Analysis

Stata 14 (Release 14; StataCorp, 2015) was used for all data analysis and α=.05 was used as the threshold for statistical significance for all tests. Values greater than .7 and .8 for Cronbach's alpha were taken as indicating acceptable and good internal consistency reliability, respectively.

The development of a candidate short version of the 30-item PSQ (PSQ30) began by fitting confirmatory factor analysis (CFA) models for each of the four subscales of the 20-item version of the PSQ (PSQ20) and for its four subscale scores (Fliege et al., 2005) on an overall

stress construct. Modification indices for the CFA model for the overall stress construct were used to identify up to one possible subscale score error covariance term to be included in its model specification. Indicators for "good" fit for all CFA models included standardized root mean residual < .06, comparative fit index (CFI) > .95, and Tucker–Lewis index (TLI) >.95, with TLI > .90 considered "acceptable" fit.

Following the CFA models, item response theory (IRT) graded response models were used to identify relatively low information items within subscales of the PSQ20, and such items were removed in backward selection process, from five items to three items for each subscale. In cases in which the item information function for a single item of the three remaining, backwardly selected items in a subscale dominated the item information function for the remaining two items, that single item was retained as a candidate for the PSQ short version. In cases in which comparably strong item information functions for two items dominated the item information function for a third remaining item, both such items were retained as candidates for the PSQ short version. In this way, one to two items of each subscale of the PSQ20 were retained as candidates for the PSQ short version.

All candidate items for the PSQ short version were fit on a single-factor CFA model that included error covariance terms between items retained from the same PSQ20 subscale and between items retained from any PSQ20 subscales, with an error covariance term specified between them in the overall stress construct CFA model. Strength of associations among scale scores for the PSQ30, the PSQ20, and the candidate PSQ short version were assessed by calculating intraclass correlation coefficients (ICCs). Pearson's correlations were used to examine strength of associations among the PSQ30, PSQ20, and candidate PSQ short version

scale scores and scale scores for Stigma, Barriers, and Resilience, as well as the treatment-seeking indicator variable.

Results

The CFA and IRT analyses resulted in a six-item candidate short version of the PSQ (PSQ6). As shown in Tables 1 and 2, CFA models for the PSQ20 subscales, the PSQ20 overall stress construct, and the PSQ6 displayed acceptable-to-good fit with acceptable-to-good internal consistency. One item, "you are lighthearted," on one subscale of the PSQ20 showed a factor loading below .5. All items on the PSQ6 had factor loadings near or exceeding .7, and all included terms in all CFA models were statistically significant.

Scale scores for the PSQ30 and the PSQ20 were nearly perfectly correlated, and the scale score for the PSQ6 was highly correlated with scale scores for both the PSQ30 and PSQ20 (Table 3). Consistent with mathematical expectations of the impact of increasing measurement error with fewer items, Table 4 displays an overall tendency toward correlation attenuation in associations of criterion variables with, successively, the PSQ30, PSQ20, and PSQ6. However, the degree of attenuation was remarkably slight. Overall, the correlations between the PSQ6 and criterion variables were nearly identical in strength, direction, and significance to those observed in earlier work using the PSQ30 (Author, 2016, 2017).

Discussion

Our analysis shows that a 6-item candidate measure, the PSQ6, is strongly associated with the PSQ30 in this study sample and retains similar psychometric properties to both the PSQ30 and PSQ20, albeit at the expense of granularity. Regarding the use of the PSQ6 as a pragmatic measure for studies of stress involving military personnel, our analysis is preliminary, but there are indications of promise. We lack data regarding response burden and importance to

stakeholders of the PSQ6, but presumably completion time for a six-item reduced inventory would be far less than for the parent questionnaire or the 20-item alternative. Given the high correlation (ICC = .92) between the PSQ6 and PSQ30, it seems reasonable to expect that the PSQ6 would share the demonstrated sensitivity to change properties of the PSQ30 (Fliege et al., 2005); however, that remains to be tested in future research. The extent to which PSQ6 scores are actionable, Glasgow and Riley's (2013) other minimum criterion for a pragmatic measure, is currently unclear. Further research would be needed to elucidate how the PSQ6 could be incorporated into screening or tailored, participatory, evidence-based interventions.

Important limitations of this study include a low survey response rate in the original study and concerns about the generalizability of a study focused on Air Force nursing personnel to other military personnel. Independent verification of the psychometric properties of the PSQ6 and its relationship to the PSQ30 in new or existing study samples would strengthen the results of this study, as would analyses of relationships between the PSQ6 and PSS4, the four-item version of Cohen's Perceived Stress Scale (Cohen et al., 1983). Although the PSQ6 shows promise as a reliable measure of overall stress, either of the longer versions of the PSQ would be more appropriate where finer-grained, dimensional analysis of stress is wanted.

Conclusion

This study is responsive to the importance of measuring stress in military personnel and could serve as a step toward more pragmatically assessing interventions that aim to ameliorate such stress. Based on our findings, the PSQ6 is a potential low-burden instrument that could be used to measure stress being experienced by military personnel. Future research is currently in the planning stages to assess the psychometric properties of the PSQ6 in a new sample of

military nursing personnel and, potentially, its usefulness in providing actionable information to health care providers serving broader military populations.

References

Author. (2016).

Author. (2017).

Britt, T. W., Bennett, E. A., Crabtree, M., Haugh, C., Oliver, K., McFadden, A., & Pury, C. L. S. (2011). The theory of planned behavior and reserve component veteran treatment seeking. *Military Psychology*, *23*, 82-96. https://doi.org/10.1080/08995605.2011.534417

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*, 385-396.

Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson Resilience scale (CD-RISC). *Depression and Anxiety*, *18*, 76-82. https://doi.org/10.1002/da.10113

Fliege, H., Rose, M., Arck, P., Walter, O. B., Kocalevent, R.-D., Weber, C., & Klapp, B. F. (2005). The Perceived Stress Questionnaire (PSQ) reconsidered: Validation and reference values from different clinical and healthy adult samples. *Psychosomatic Medicine*, *67*, 78-88. https://doi.org/10.1097/01.psy.0000151491.80178.78

Glasgow, R. E., & Riley, W. T. (2013). Pragmatic measures. *American Journal of Preventive Medicine*, *45*, 237-243. https://doi.org/10.1016/j.amepre.2013.03.010

Hoge, C. W., Castro, C. A., Messer, S. C., McGurk, D., Cotting, D. I., & Koffman, R. L. (2004). Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *New England Journal of Medicine*, *351*, 13-22. https://doi.org/10.1056/NEJMoa040603

Institute of Medicine. (2014). *Preventing psychological disorders in service members and their families: An assessment of programs*. Washington, DC: The National Academies Press. https://doi.org/10.17226/18597

Kim, P. Y., Britt, T. W., Klocko, R. P., Riviere, L. A., & Adler, A. B. (2011). Stigma, negative attitudes about treatment, and utilization of mental health care among soldiers. *Military Psychology, 23*, 65-81. https://doi.org/10.1080/08995605.2011.534415

Kocalevent, R.-D., Levenstein, S., Fliege, H., Schmid, G., Hinz, A., Brähler, E., & Klapp, B. F. (2007). Contribution to the construct validity of the Perceived Stress Questionnaire from a population-based survey. *Journal of Psychosomatic Research, 63*, 71-81. https://doi.org/10.1016/j.jpsychores.2007.02.010

Langston, V., Greenberg, N., Fear, N., Iversen, A., French, C., & Wessely, S. (2010). Stigma and mental health in the Royal Navy: A mixed methods paper. *Journal of Mental Health, 19*, 8-16. https://doi.org/10.3109/09638230802522999

Levenstein, S., Prantera, C., Varvo, V., M., S., Berto, E., Luzi, C., & Andreoli, A. (1993). Development of the Perceived Stress Questionnaire: A new tool for psychosomatic research. *Journal of Psychosomatic Research, 37*, 19-32.

Ramchand, R., Acosta, J., Burns, R., Jaycox, L., & Pernin, C. (2011). *The war within: Preventing suicide in the U.S. military*. Santa Monica, CA: RAND Corporation.

StataCorp. (2015). Stata Statistical Software (Release 14) [software]. College Station, TX: StataCorp.

Table 1

Factor Loadings and Fit for the PSQ20 Scale and Subscales (N = *239)*

Items and Subscales	*Coef*[a] (*SE*)	Alpha,[b] CFI, TLI, SRMR
Worries		.85, .96, .93, .03
You fear you may not manage to attain your goals	.74 (.04)	
You feel frustrated	.73 (.04)	
Your problems seem to be piling up	.85 (.03)	
You have many worries	.84 (.03)	
You are afraid for the future	.73 (.04)	
Tension		.82, .96, .92, .04
You feel rested[c]	.73 (.04)	
You feel calm[c]	.82 (.03)	
You feel tense	.81 (.03)	
You feel mentally exhausted	.65 (.04)	
You have trouble relaxing	.70 (.04)	
Joy		.73, .99, .99, .03
You feel you're doing things you really like[c]	.68 (.04)	
You are full of energy[c]	.68 (.04)	
You feel safe and protected[c]	.59 (.05)	
You enjoy yourself[c]	.90 (.03)	
You are lighthearted[c]	.40 (.06)	
Demands		.82, .98, .95, .03

You feel that too many demands are being made on you	.80 (.03)	
You have too many things to do	.95 (.02)	
You feel you're in a hurry	.66 (.04)	
You have enough time for yourself[c]	.73 (.04)	
You feel under pressure from deadlines	.58 (.05)	
PSQ20[d]		.87, 1.00, .99, .01
Worries	.85 (.02)	
Tension	.90 (.02)	
Joy[c]	.74 (.03)	
Demands	.70 (.04)	
Error covariance, Joy and Demands[e]	−.21 (.08)	

Note. Italicized items retained in PSQ6. PSQ = Perceived Stress Questionnaire; Coef = coefficient; *SE* = standard error; CFI = comparative fit index; SRMR = standardized root mean residual; TLI = Tucker–Lewis index.

[a]Standardized regression coefficient. [b]Cronbach's alpha. [c]Reverse-coded item or subscale score. [d]Model fit using subscale scores. [e]$p = .006$; $p < .001$ for all other coefficients.

Table 2

Factor Loadings and Fit for the PSQ6 Scale (N = *239)*

Items	*Coef*[a] (*SE*)	Alpha,[b,c] CFI, TLI, SRMR
		.85, .98, .94, .03
Your problems seem to be piling up	.76 (.04)	
You have many worries	.72 (.04)	
Error covariance, problems and worries	.40 (.07)	
You feel mentally exhausted	.80 (.03)	
You have trouble relaxing	.76 (.04)	
Error covariance, exhausted and trouble	.27 (.08)[d]	
You enjoy yourself[e]	.68 (.05)	
You have too many things to do	.73 (.04)	
Error covariance, enjoy and to do	–.37 (.09)	

Note. PSQ = Perceived Stress Questionnaire; Coef. = coefficient; CFI = comparative fit index; SRMR = standardized root mean residual; TLI = Tucker–Lewis index.

[a]Standardized regression coefficient. [b]Cronbach's alpha. [c]$\alpha = .95$ for the PSQ30; $\alpha = .92$ for the PSQ20. [d]$p = .001$; $p < .001$ for all other coefficients. [e]Reverse-coded item.

Table 3

Correlations Among the PSQ30, PSQ20, and PSQ6 Scale Scores (N = 239)

	PSQ30	PSQ20
Scale	ICC (95% CI)	ICC (95% CI)
PSQ30		
PSQ20	.98 [.97, .99]	
PSQ6	.92 [.90, .94]	.92 [.88, .95]

Note. $p < .001$ for all ICC estimates. PSQ = Perceived Stress Questionnaire; ICC = intraclass correlation coefficient; CI = confidence interval.

Table 4

Convergent Validity of PSQ Scale Scores (N = 239)

	PSQ30	PSQ20	PSQ6
Scores	*r* (*SE*)	*r* (*SE*)	*r* (*SE*)
Stigma	.41 (.05)	.38 (.05)	.36 (.05)
Barriers	.23 (.06)	.22 (.06)	.18[a] (.06)
Resilience	–.53 (.04)	–.54 (.04)	–.48 (.05)
Treatment-seeking[b]	.30 (.06)	.29 (.06)	.31 (.06)

Note. PSQ = Perceived Stress Questionnaire. *SE* = standard error.

[a]$p = .003$; $p < .001$ for all other values of Pearson's r. [b]$n = 234$.