Evaluating the Merits of Using Brief Measures of PTSD or General Mental Health Measures in Two-Stage PTSD Screening

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Abstract

Psychological screening of large numbers of personnel returning from deployments should be as brief as possible without sacrificing the ability to detect individuals who are experiencing serious psychological difficulties. This study focused on screening for Posttraumatic Stress Disorder (PTSD) symptomatology in 421 deployed male members of the Australian Army whilst they were on deployment and again three to six months after they returned home. The first aim was to evaluate the performance of the Primary Care - Posttraumatic Stress Disorder Screen (PC-PTSD) and a four-item version of the 17-item Posttraumatic Stress Disorder Checklist (PCL). A second aim was to evaluate the role of the Kessler-10 (K10) in psychological screening. The results indicated that the short form of the PCL was a much better substitute for the full PCL than the PC-PTSD. Other results suggested that a more efficient screening process can be achieved using the K10 in a two-stage screening process that has the potential to embrace a wider range of psychological problems.

The provision of psychological support services to deployed Australian Defence Force (ADF) personnel forms part of the ADF Mental Health and Wellbeing Strategy aimed at enhancing ADF operational capability [1]. Deployed ADF personnel receive a continuum of mental health support designed to enhance their ability to cope with the challenges of deployment and to ensure an effective transition back to work and family life. An important element in this continuum is the psychological screening of deployed personnel that occurs when they leave the area of operations and then again at three to six months after return to Australia. Screening at the end of the deployment includes the administration of a Return to Australia Psychological Support (RtAPS) questionnaire. At three to six months post-deployment, personnel complete a Post-Operation Psychological Support (POPS) questionnaire. Key components of both the RtAPS and the POPS questionnaires are two scales, one designed to screen for depression and anxiety, the Kessler-10[2] (K10), and the other designed to assess post-traumatic stress symptomology, the Posttraumatic Stress Disorder Checklist – Civilian[3] (PCL-C).

Brevity is an important quality in a psychological test when the screening battery is to be completed by large numbers of deployed personnel. The availability of alternate short screening tests is also an important feature of screening batteries given the number of deployments currently experienced by military personnel. Repeated exposure to the same screening instrument may change the characteristics of the items and the scale[4]. These twin needs of efficiency and variety led to the first aim of the current study which was to evaluate the performance of two short screening questionnaires for PTSD. A second aim arose from the fact that the ADF uses both the PCL and the K10 in its end-of-deployment and post-deployment screens, thus allowing an assessment of the degree of overlap between the PCL-C and the K10. These instruments differ in terms of the specificity of the mental health symptoms they are designed to detect. In a situation where there is more than one screening

instrument, overlap between the instruments should also be investigated because overlap may open up other avenues for achieving efficiencies. This study contributes valuable information on these possibilities. A brief description of each instrument follows.

<u>Screening Instruments Administered to Deployed ADF Personnel</u>

The PCL is a 17-item self-report checklist, based on the 17 DSM-IV-TR diagnostic criteria for PTSD. There are several versions of the PCL. The PCL-Military (PCL-M) covers particular military events, whereas the PCL-Specific (PCL-S) is a non-military version that refers to a specific traumatic event. The more generic PCL-C is the one administered by the ADF. It is an integral part of the ADF psychological screening process of deployed personnel, appearing in both the RtAPS and POPS. The PCL-C demonstrates adequate validity and reliability in military settings and is regarded as a good screen for PTSD[5,6].

The K10 is a 10-item self-report measure of non-specific psychological distress[7]. It is used to measure levels of current anxiety and depressive symptoms and to identify the need for further psychological assistance. The reliability and validity of the instrument has been established in the ADF[6] and it forms an integral component of the ADF psychological screening process, appearing in both the RtAPS and POPS. Andrews and Slade[7] demonstrated that people with high scores on the K10 have a higher probability of meeting criteria for various DSM-IV disorders. Expressing this differently, people with a range of psychological disorders are likely to have elevated scores on the K10. It follows then that because of the non-specific nature of the K10 and its sensitivity to a broad range of psychological disorders, people suffering from PTSD should also score highly on the K10. If so, it is possible that the K10 could be paired with the PCL-C in a strategic way so that screening efficiencies are achieved by administering the PCL-C only to those who score highly on the K10. We investigate that proposition in the current study.

Short Screening Instruments

The two short PTSD screening instruments that were trialled for the first time in an ADF setting were the PC-PTSD and an equally short form of the PCL-C. The PC-PTSD[8] was designed in response to a need to screen large numbers of people for PTSD after combat or disaster, or in medical settings when time is limited. It has four "Yes-No" items that represent the four major symptom clusters found in most PTSD factor analytic studies: re-experiencing, numbing, avoidance, hyperarousal. The PC-PTSD has been found to be a useful screening instrument for PTSD within a civilian population[9] and to be as efficient as the General Health Questionnaire[10] (GHQ-12) at predicting PTSD[11]. The PC-PTSD is now widely used in the US Army as a screening tool[4,12].

Short forms of the PCL are also available for screening. Lang and Stein[13] developed four short forms of the PCL-C for use in primary care settings and recommended using either a two-item or a six-item version of the instrument, depending on the specific needs of the clinic. However, the validity of these shortened instruments was questioned by Hirschel and Schulenberg[14] who, among other criticisms, questioned the failure of the two-item version to sample items from all three PTSD clusters. Bleise et al.[4] developed a four-item version of the PCL that performed almost as well as the full 17-item version in military settings. This shortened version contained at least one item from the PTSD domains of re-experiencing, avoidance, and increased arousal. Because of its greater regard for item content, we used the Bleise et al.[4] short form in the current study.

Study Aims, Design, and Statistical Analysis

It is not unusual to find that reports of efficient screening tools are not substantiated by follow-up studies in different contexts[15]. To date, there have been no studies of the validity of the PC-PTSD or the four-item version of the PCL-C in the context of Australian military operations. In a high operational-tempo environment where screening, not diagnosis,

is the primary focus, these shortened instruments may be more efficient and viable alternatives to the PCL-C. The first aim of this study was to test this proposition. A second aim was to assess the extent of the overlap between the K10 and the PCL-C. Our interest here was to determine whether there are efficiencies to be achieved in the way these two instruments are used.

In this study, there were no clinical diagnostic interviews to confirm the presence of PTSD or any other form of mental illness[16] so the main criterion for judging the screening value of these tools was the extent to which they produced results that were similar to those produced using the PCL-C. We based this decision on validation studies demonstrating that the PCL-C is a reliable indicator of PTSD[4].

It is common practice when using screening instruments to identify cut-off scores that can be used to sort people into various risk groups. The ADF follows this practice too and the cut-off scores for the various measures are described in the Method section. The analyses were therefore partly based on descriptive statistics, correlations, and multiple regression analyses but also on cross-tabulation techniques that capitalised on the fact that cut-off scores were available for all four instruments used in this study.

Method

Participants

A total of 421 ADF Army personnel who had deployed to Iraq between May 2007 and July 2008 completed both the deployment (RtAPS) and the post-deployment (POPS) surveys. The sample consisted of males whose ages ranged from 18 to 55 with a median age of 28 years. Years of service ranged from 1 to 34 with a median of 7 years and all participants had deployed at least twice. Junior soldiers and junior Non-Commissioned Officers (JNCOs) made up the bulk of the sample (78.3%).

Instruments

Four instruments were used in this study. Their backgrounds have already been described. What follows is a brief description of the structure of each instrument.

Posttraumatic Stress Check List - Civilian (PCL-C). The PCL-C contains 17 items that employ a five-point Likert-type response scale ranging from (1) *Not at all* to (5) *Extremely*. Total scores were computed with high scores indicating high risk of PTSD. Within the ADF, scores below 30 are considered to be low risk. The internal consistency reliability estimate for this scale was .89 for the first testing session and .93 for the second session.

Posttraumatic Stress Disorder Check List - Civilian Short Form (PCL-C Short). Although not administered as a separate test, a short version of the PCL-C was formed using responses to items 1, 5, 7, and 15 from the PCL-C. A cut-off score of 7 indicates the presence of PTSD symptoms[4]. The internal consistency reliability estimate of the PCL-C Short was .72 in the present study.

K10. The 10 items of the K10 employ a five-point Likert-type response scale ranging from (1) *None of the time* to (5) *All of the time*. A total score was computed with a high score indicating high levels of psychological distress. Within the ADF, scores below 15 are regarded as low risk. The internal consistency reliability estimate (Cronbach's alpha) for this scale was .91 for the first testing session (i.e. RtAPS) and .90 on the second session (i.e. POPS).

Primary Care Posttraumatic Stress Disorder Screening Questionnaire (PC-PTSD). The PC-PTSD[8] has four "Yes-No" items that represent the four major symptom clusters found in most PTSD factor analytic studies (re-experiencing, numbing, avoidance, hyperarousal). Total PC-PTSD scores were obtained by summing the scores on these four items. High scores indicate high risk. A score of two or more suggests the presence of PTSD[8]. The internal

consistency reliability estimate for this scale was .54 in the current study. This scale was not

administered in the post-operational phase of the study.

Procedure

       The RtAPS questionnaire was administered in-country by deployed psychologists and

psychology support staff whilst the POPS questionnaire was administered approximately

three to six months after returning to Australia. For the remainder of this paper, we refer to

the RtAPS scales as Time 1 measures and to the POPS scales as Time 2 measures.

Results

       The first aim of this study was to evaluate the performance of two short PTSD

screening devices, the PCL-C Short and the PC-PTSD. As a preliminary step, the means,

standard deviations, and correlations of all variables are shown in Table 1.

Table 1

Descriptive Statistics and Correlations for All Variables

Variable	M	SD	α	1	2	3	4	5
Time 1								
1. PCL-C	21.84	6.83	.89					
2. PCL-C Short	4.92	1.77	.72	.87**				
3. K10	13.48	5.01	.91	.50**	.43**			
4. PC-PTSD	.23	.60	.54	.50**	.44**	.30**		
Time 2								
5. PCL-C	21.23	7.27	.93	.52**	.43**	.40**	.30**	
6. K10	13.41	4.79	.90	.44**	.39**	.40**	.27**	.82**

$** p < .01$

       The first point to note about these descriptive data is that all the means were within

the low risk range at *both* time points, indicating a relatively low incidence of PTSD and

other mental health problems in this sample, a situation that will become more evident when scores are sorted into risk categories later in these analyses. The second point to note is that the internal consistency reliability estimates were much lower for the PCL-C Short and the PC-PTSD than for the PCL-C. The fact that they were less reliable is not surprising, given the differences in test lengths, but the low .54 reliability for PC-PTSD raises questions about its ability to serve as a substitute for the PCL-C.

The availability of Time 1 and Time 2 scores for the criterion variable (PCL-C) meant that the predictive validities of the two screening instruments could be assessed as part of their evaluation. It can be seen from Table 1 that the correlation between PC-PTSD (Time 1) and PCL-C (Time 2) was .30, compared with .52 for the PCL-C (Time 1 and Time 2). Hierarchical regression analysis confirmed that the PC-PTSD was a modest contributor to PCL-C (Time 2) scores. When entered first into the regression equation, PC-PTSD explained 9.1% of the variance, $F (1, 407) = 40.92$, $p < .01$. When it was entered at the second step, PCL-C (Time 1) explained an additional 19.0%, $F\Delta (1, 407) = 107.26$, $p < .01$. When both predictors were entered simultaneously, the contribution of PC-PTSD was not significant. The findings relating to the PCL-C Short, on the other hand, were more encouraging. The very strong relationship between the short and the long forms of the PCL ($r = .87$) suggests that similar outcomes will be obtained whichever of the scales is used. Because of their statistical dependence, the predictive validities of the long and the short form of the PCL-C were estimated by squaring their correlation coefficients (.52 and .43 respectively). The long form of the PCL-C therefore explained 27.04% of the variance in PCL-C scores at Time 2 whilst the short form explained 18.49%, double the amount of variance explained by the PC-PTSD.

The use of risk classifications offers another, more concrete, way of illustrating the overlap between the different scales. Accordingly, the Crosstabs procedure in SPSS was used

to check the degree of correspondence between the risk classifications yielded by the longer instrument and the two shorter instruments. As noted in the Method section, the cut-offs were 30 for the PCL-C, 7 for the PCL-C Short, 15 for the K10, and 2 for the PC-PTSD. For comparison purposes, Table 2 shows the breakdown for PCL-C risk classifications at Time 1 and Time 2. These data are presented to demonstrate that over the period of the study, which included transition from a deployed to a non-deployed situation, it is unrealistic to expect that there will be no changes in classification, even when the longer form of the screening instrument is used on both occasions. Table 2 shows that there was a moderate degree of overlap (Phi = .34, $p < .01$). A pleasing feature is the drop in the number of people classified as high risk (34 at Time 2 versus 46 at Time 1). Another pleasing feature is that of the 46 people classified as low risk at Time 1, 30 had moved to the low risk category by Time 2. This movement was offset to some extent by the 18 individuals who moved into the high risk category at Time 2 and the 16 individuals who remained in the high risk category.

Table 2

Risk Classifications for PCL-C at Time 1 and Time 2

PCL-C Time 1	PCL-C Time 2			Phi
	Low Risk	High Risk	Total	
Low Risk	357	18	375	
High Risk	30	16	46	
Total	387	34	421	
Phi				.34**

** $p < .01$

The abbreviated instruments were presented at Time 1 only but it is important to examine the overlap with PCL-C at both time points because the Time 2 overlap reflects the predictive validity of the shorter instruments. Table 3 shows that for PCL-C Short there was a high degree of overlap at Time 1 (Phi = .71, p < 01) but much less at Time 2 (Phi = .26, p < .01).

Table 3

Risk Classifications Based on PCL_C Short (Time 1) and PCL-C (Time 1 and Time 2)

PCL-C Short	PCL-C Time 1			PCL-C Time 2		
	Low Risk	High Risk	Total	Low Risk	High Risk	Total
Low Risk	360	10	370	350	20	370
High Risk	15	36	51	37	14	51
Total	375	46	421	387	34	421
Phi	.71**			.26**		

** *p* < .01

In terms of actual numbers, of the 375 respondents classified as low risk by the full PCL-C at Time 1, a total of 370 were placed in the same category by the PCL-C Short. Given the high base rate of low risk classifications, a large amount of overlap was expected in this category. A more telling statistic relates to the overlap in the number of respondents classified as high risk. If the shorter instruments are to be used as replacements, they need to identify a substantial proportion of those identified as high risk by the longer instrument. When this category was examined, of the 46 classified as high risk by PCL-C at Time 1, a total of 36 were similarly classified by the shortened form of the questionnaire. The PCL-C

Short (Time 1) by PCL-C (Time 2) comparisons yielded very similar results to those obtained

for the full scale (Table 2).

    Table 4 reports the classifications obtained from the PC-PTSD and the PCL-C.

Table 4

Risk Classifications Based on PC-PTSD (Time 1) and PCL-C (Time 1 and Time 2)

	PCL-C Time 1			PCL-C Time 2		
PC-PTSD	Low Risk	High Risk	Total	Low Risk	High Risk	Total
Low Risk	356	32	388	360	28	388
High Risk	8	13	21	15	6	21
Total	364	45	409	375	34	409
Phi	.38**			.17**		

** *p* < .01

    The Phi coefficient was a moderate .38 at Time 1 and .17 at Time 2. The most telling

discrepancy at Time 1 was in the high risk category where a total of 32 respondents were

identified as high risk by the PCL-C but as low-risk by the PC-PTSD. The number of people

identified as high risk by the PC-PTSD was less than half the number identified by the PCL-

C at Time 1. These data suggest that the PC-PTSD is not only a less reliable but also a less

sensitive instrument than either the PCL-C or the PCL-C Short.

    The second aim of the study was to assess the overlap between the K10 and PCL-C

screening instruments. Table 5 contains the breakdowns for K10 (Time 1) paired with PCL-C

(Times 1 and 2).

Table 5

Risk Classifications Based on K10 (Time 1) and PCL-C (Time 1 and Time 2)

	PCL-C Time 1			PCL-C Time 2		
K10 Time 1	Low Risk	High Risk	Total	Low Risk	High Risk	Total
Low Risk	294	11	305	296	9	305
High Risk	81	35	116	91	25	116
Total	375	46	421	387	34	421

There are two points to note about the data shown in Table 5. Firstly, more people are classified as high risk when the K10 is used because this instrument is capable of detecting a wide range of disorders. Secondly, the K10 measure at Time 1 captures a large proportion of those people who are classified as high risk on the basis of their PCL-C Time 1 (35 out of 46) and PCL-C Time 2 scores (25 out of 34). The K10 Time 2 x PCL-C Time 2 cross-tabulation is not shown but the result is even stronger with 34 out of 34 high PCL-C high risk classifications also picked up by the K10. In other words, if respondents were classified as high risk by the PCL-C, they were also classified as high risk by the K10. Because of the more general scope of the K10, the converse does not apply: there were 74 respondents classified as high risk by the K10 who did not report enough PTSD symptomatology to fall into the PCL-C high risk category.

Discussion

In relation to the first aim of the study, there was little support for the use of PC-PTSD as a replacement screening instrument for PTSD. To begin with, its internal consistency reliability was weak ($\alpha = .54$). Whilst there is some justification for the use of tests with reliabilities as low as .50 in research settings, there is a high degree of risk involved in the use of such tests as the basis for clinical judgements or selection decisions[17]. Secondly,

although it was moderately correlated with the PCL-C at both time points, it resulted in risk

classifications that were quite different from those obtained using the PCL-C. The biggest

concern is that it resulted in fewer than half the number of risk classifications produced by

the PCL-C. More importantly, given that the main argument for using the PC-PTSD is that it

contains just four items, it did not perform as well as the four-item version of the PCL-C

recommended by Bleise et al.[4] We base this conclusion not on the high correlation between

the long and the short form of the PCL-C at Time 1, which is not surprising given that the

short test is part of the larger one, but on the similarity of the classifications obtained from

the PCL-C Short and the PCL-C at Time 1 and Time 2. The results of this study therefore do

not support the replacement of the PCL-C with the shorter PC-PTSD. If a shorter instrument

is required, the four-item version of the PCL-C is a better option.

Another important finding to emerge from this study was the benefit of using both

screening instruments – the PCL-C and the K10 – to predict subsequent mental health

outcomes. What is important in field settings is not the actual K10 score or the PCL-C score,

but the risk category to which this score belongs. The K10 is a non-specific measure of

psychological distress. The PCL-C, on the other hand, targets symptoms associated with a

particular illness, that is, PTSD. Theoretically, someone with PTSD is likely to have elevated

scores on the K10 but someone with a high K10 score may not have a high score on an

instrument that screens for PTSD. Translating these expectations into the framework of this

study, people who are rated as high risk on the basis of the PCL-C scores are also likely to

fall into the high risk category on the K10, but not vice-versa. Table 2 shows that this

expectation was fulfilled with the current data. Most of the people who fell into the high risk

categories on the two occasions the PCL-C was administered also fell into the K10 (Time 1)

high risk category (see Table 4). When Time 2 K10 and PCL-C risk classifications were

compared, all 34 people classified as high risk by the PCL-C were also classified as high risk by the K10.

Up to this point, efforts at achieving screening efficiencies have focussed on using smaller instruments (e.g., PC-PTSD, PCL-C Short). However, if the proposed nature of the relationship between K10 and PCL-C risk classifications can be demonstrated with a much larger dataset, a strategy that relies upon an initial K10 screening followed by a more intensive PTSD screening for the people who are detected by the K10 filter would be a better strategy. If the figures from this sample (see Table 4) prove to be typical, initial K10 screening would leave just 25% of the original sample subject to further screening. An additional advantage of an initial K10 filter is that other forms of mental illness could also be targeted in the second-stage screening.

Limitations

A limitation of the current study is that no diagnostic criteria were available from interviews, relying instead on data from screening instruments and measures of psychological health. In other words, the benchmark against which these short screening instruments were evaluated was performance on the PCL-C, not actual diagnoses of PTSD. Establishing prevalence rates of mental health conditions in the ADF was a recommendation of a major review of ADF Mental Health Care in 2009[18]. An outcome of that review was the implementation of an ADF Mental Health and Wellbeing Prevalence Study to gather diagnostic information to validate the K10 and the PCL-C in a much broader context[6]. Whilst acknowledging that the absence of actual PTSD diagnoses was a limitation of the current study, we point out that the PCL-C and the cut-off value of 30 have been validated against diagnostic criteria in other military settings[4].

A second limitation of the current study concerns the fact that the abbreviated form of the PCL-C (PCL-C Short) was not administered separately. Its true overlap with the full form

of the PCL-C can only be estimated when the two forms are administered separately[14]. This

is something that needs to be addressed in future research. A third limitation was that the

validation sample comprised Army males. There were a small number of females and non-

Army personnel in the original sample but they were too few in number to enable sample

breakdowns and were therefore excluded to homogenise the sample.

Although not necessarily a limitation, one noteworthy aspect of the data from this

study was the low mean scores on the PCL-C, PCL-C Short, PC-PTSD, and K10 scales. A

possible reason was suggested by Bleise et al.[4] who observed that PCL scores were 10 points

higher for an anonymous surveillance sample than for a sample being screened for PTSD

symptoms and possible health care referrals. In the case of the latter sample, the stigma

associated with mental illness may have led to under-reporting of symptoms. In the context of

the current study, there may also have been concern that referrals might prejudice future

deployments and/or career progress. Under-reporting, if it occurred here, would be partly

responsible for the high incidence of low risk classifications, making it more difficult to

evaluate the efficiency of screening tests, which perform best when there is a balance

between low risk and high risk classifications.

Conclusion

The main finding to emerge from this study is that the PC-PTSD is not a viable

candidate to replace the PCL-C as a PTSD screen. If brevity of assessment is the objective,

the four-item version of the PCL-C is a better option. A second finding, which is linked to a

suggestion for further research, is that a better method of achieving efficiencies is to

administer the K10 to all deployed personnel as a front-end screening device and to use other

instruments for additional assessment of those who have been rated high risk on the basis of

their K10 scores. Because the follow-up assessments will involve a much smaller number of

people, they do not have to be confined to PTSD; risk analysis for other psychological

conditions can also be conducted. As a final consideration, the impressive overlap between the PCL-C and PCL-C Short suggests that a combination of brief measures and K10 filtering may also work well. The K10 score would serve as an indicator of general mental health issues and the four-item PCL-C Short would indicate whether the issues were likely to be associated with PTSD. This two-step decision process should improve the reliability of the screening without sacrificing the need for efficiency.

It is recommended that future research is conducted to address the limitations identified within this current study. Research with a sample inclusive of both male and female military personnel, access to diagnostic criteria, and administration of both the PCL-C Short and PCL-C as separate instruments will add support to these findings.

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