

Confirmatory Factor Analysis of the Dysfunctional Attitude Scale in a Student Sample¹

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Beck, Brown, Steer, and Weissman (1991) factor analyzed the Dysfunctional Attitude Scale (DAS) in a clinical population, developing nine subscales thought to measure specific cognitive vulnerabilities to depression. As the DAS is often used in research using student populations, the present study sought to confirm whether the Beck et al. factors generalize to student samples. Confirmatory factor analysis of the nine-factor Beck et al. model was performed on DAS responses given by 866 undergraduates. The Beck et al. factor structure was not replicated in the student sample. Principal-axis factoring of these data, as well as results of other factor-analytic studies of the DAS, suggests that three subscales are appropriate for student samples. One combines Beck et al.'s first, third, and seventh factors, one combines Beck et al.'s second and ninth factors, and one replicates Beck et al.'s fifth factor.

KEY WORDS: DAS; confirmatory factor analysis; subscales.

One of the strengths of Beck's cognitive theory of depression (Beck, 1963, 1967, 1987) and its more recent extensions to other forms of psychopathology (Beck, 1976; Beck, Rush, Shaw, & Emery, 1979) is its emphasis on

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measuring relevant constructs. The Dysfunctional Attitude Scale (DAS; Weissman, 1979; Weissman & Beck, 1978) was developed to measure cognitive vulnerability to depression, that is, the strength of underlying tacit beliefs an individual holds which are hypothesized to be activated by congruent stressors to produce negative affect.

The DAS was originally conceptualized as a global measure of vulnerability to depression. Recently, Beck and his colleagues (Beck, Brown, Steer, & Weissman, 1991) sought to develop more specific measures of cognitive vulnerability from the DAS. Using data from pretreatment evaluations of over 2,000 outpatients, they performed an exploratory factor analysis (EFA) of the long (100-item) form of the DAS. Sixty-six of the original 100 items were retained. They found nine factors: (1) Vulnerability, (2) Need for Approval, (3) Success-Perfectionism, (4) Need to Please Others, (5) Imperatives, (6) Need to Impress, (7) Avoidance of Appearing Weak, (8) Control Over Emotions, and (9) Disapproval-Dependence. They proposed that these factors be used to address research questions which have arisen from Beck's more recent (1987) statement of his theory, which asserted that particular dysfunctional beliefs will interact with specific aspects of an individual's personality and with particular stressors. Beck et al. (1991) also suggested their factors might be used as subscales by clinicians assessing the dysfunctional attitudes of their patients (p. 478).

Beck et al. (1991) recognized that, for subscales derived from their factors to be useful in research, "the generalizability of [these nine] factors . . . needs to be determined in populations with different demographic characteristics and in samples that are not self-selected for cognitive therapy" (p. 482). This is especially important because much of the research using the DAS has been conducted using nonclinical samples, usually college students (e.g., Barnett & Gotlib, 1988a; Barnett & Gotlib, 1990; Kwon & Oei, 1992; Olinger, Kuiper, & Shaw, 1987; Power, 1988; Robins & Block, 1989; Whittal & Dobson, 1991).

There have been several other factor-analytic studies of the DAS. Prior to the Beck et al. (1991) factor analysis, researchers factor analyzed two short (40-item) forms of the DAS, using nonclinical samples (Cane, Olinger, Gotlib, & Kuiper, 1986; Oliver & Baumgart, 1985). Although the short forms had been constructed to be similar to the long form and to each other in content, Oliver & Baumgart demonstrated that the two forms were not equivalent to each other, and were less reliable than the long form. However, until the Beck et al. study, no one had factor analyzed the 100-item DAS.

At about the same time Beck et al. (1991) completed their factor analysis, Dyck (1992) factor analyzed the 100-item DAS to develop subscales to measure specific cognitive vulnerabilities. Using data from Aus-

tralian undergraduates, he developed eight subscales: (1) Impression Management, (2) Approval by Others, (3) Imperatives, (4) Need to Succeed, (5) Pleasing Others, (6) Vulnerability, (7) Catastrophizing, and (8) Dichotomous Thinking. Several of Dyck's subscales overlap with those of Beck et al. For instance, Dyck's Approval by Others factor contains many of the same items as Beck et al.'s Need for Approval. Items clustering in Dyck's Pleasing Others factor also cluster in Beck et al.'s Need to Please Others. Dyck's and Beck et al.'s Imperative factors are quite similar. However, other of Dyck's subscales (e.g., Need to Succeed, Vulnerability, Catastrophizing) appear to show little in common with those of Beck et al.

Recently, Power et al. (1994), using a sample composed of formerly depressed patients, their relatives, and general practitioner patients, developed a short form of the DAS which consisted of three subscales. They selected 24 items which appeared to measure three types of cognitive vulnerability: Achievement, Dependency, and Self-Control. Confirmatory factor analysis (CFA) of the three-factor model found that most of the items did indeed load on the hypothesized factors.

Dyck's (1992) factor solution suggests that some of Beck et al.'s (1991) factors may be appropriate for research using Australian undergraduates, but others may not. However, to this point no one has attempted to replicate the Beck et al. nine-factor solution of the DAS on a nonclinical population, as Beck et al. had recommended. The present study tested whether the factor solution obtained by Beck et al. generalizes to a U.S. undergraduate sample. CFA was employed to test how well the nine-factor model fits data obtained from this population.

METHOD

Subjects

The DAS was completed by 866 introductory psychology students who were being screened for eligibility for an unrelated study. No other instruments were completed at the same time as the DAS. The students participated in exchange for bonus credit in their course. The subjects' ages were not available; however, 574 (66.3%) subjects came from the main campus of a state university, where most students were 18 to 22 years of age. The remaining 442 (33.7%) subjects were students at a regional, nonresidential campus of a state university, where the mean age of students was approximately 27 years. Information on sex and race was available for approximately 85% of the sample. Of those who identified their sex, 32% were

male and 68% were female. Of those identifying their race, 8% were Black, 90% were White, and 2% identified themselves as neither Black nor White.

Materials and Procedure

The DAS was administered to subjects in groups. The DAS consists of 100 items which are rated on a 7-point Likert scale, ranging from *totally agree* through *neutral* through *totally disagree*. Responses are scored from 1 to 7, with higher scores indicating more maladaptive thinking.

RESULTS

Confirmatory Factor Analysis of Original Model

As the DAS scores were uncorrelated with gender (no item-gender correlation coefficient was greater than .19), male and female subjects were combined into a single sample for purposes of model testing. Preliminary analyses indicated that the scores were not multivariate normal; therefore, confirmatory factor analysis with censored variables (a distribution-free technique) was performed. LISREL 7.16 (Jöreskog & Sörbom, 1989) was used to test the nine-factor oblique model suggested by Beck et al. (1991). Beck et al. developed their model using items with factor loadings of .38 or greater; thus these items were entered into the model as loading on that factor. The resulting model containing 68 loadings (66 primary loadings + 11 secondary loadings - 9 parameters fixed for identification purposes).

As recommended by Cole (1987) and Bollen (1989, p. 281), multiple indices were used to evaluate the model's goodness-of-fit. The data were considered to fit the model if the confirmatory factor analysis resulted in (a) a nonsignificant chi-square, (b) a goodness-of-fit index (GFI, Jöreskog & Sörbom, 1986) > .90 (c) an adjusted goodness-of-fit index (AGFI; Jöreskog & Sörbom, 1986) > .85, and (d) the root mean-square residual (RMS) < .10 (after Cox, Swinson, Parker, Kuch, & Reichman, 1993).

The chi-square goodness-of-fit was significant, $\chi^2(2032) = 5269.86$, $p < .001$. As the chi-square tests the null hypothesis that the observed data fit the hypothesized model exactly, large sample sizes tend to increase the power of the test so that even small differences between the data and the model will be detected and found to be statistically significant (Bollen, 1989, p. 268; Cole, 1987). Thus, a significant chi-square is not sufficient to say that the model is a poor fit. However, the other three fit indices also failed to meet criterion: GFI = .82, AGFI = .80, and RMS = .20. This

Table I. Coefficients Alpha for Beck et al.'s (1991) Dysfunctional Attitude Scale Factors in Original and Present Samples

Factor	Beck et al.'s (1991) coefficient alpha	Student sample coefficient alpha
1. Vulnerability	.90	.71
2. Need for Approval	.84	.73
3. Success-Perfectionism	.90	.83
4. Need to Please Others	.71	.10
5. Imperatives	.81	.70
6. Need to Impress	.79	.66
7. Avoidance of Appearing Weak	.76	.63
8. Control Over Emotions	.52	.32
9. Disapproval-Dependence	.66	.63

indicates that Beck et al.'s (1991) nine-factor model did not fit the student data.

Although the CFA of Beck's nine-factor model did not yield a good fit, a perfect fit of the entire model is not required for some of the subscales derived from Beck et al.'s factors to be useful in research with undergraduate students. To determine whether some of the subscales might be applicable to this sample, the coefficient alpha for each subscale was calculated to determine internal consistency. The results are presented in Table I. Results indicate that Beck et al.'s factors 4, 6, 7, 8, and 9 have poor internal consistency (i.e., below .70). This suggests that these five factors may not be useful in research with this population.

Since the CFA of Beck's nine-factor model was such a poor fit, the factor structure of the 66 DAS items retained by Beck et al. (1991) was tested in this sample using exploratory factor analysis. Initial principal-axis factoring yielded seven factors with eigenvalues >1.00 . The scree plot of these eigenvalues suggested limiting rotation to four factors. Oblimin rotation of the four factors resulted in the fourth factor containing only one item, thus a subsequent factor analysis limiting rotation to three factors was performed. The three factors accounted for 16.29% of the variance.

These EFA results were compared with the results of Beck et al. (1991). Factor 1 (from the present EFA) was made up primarily of items from Beck et al.'s Vulnerability (their first factor), Success-Perfectionism (third), and Avoidance of Appearing Weak (seventh) factors. Factor 2 was composed primarily of items from Beck et al.'s Need for Approval (second) and Disapproval-Dependence (ninth) factors. Factor 3 was composed primarily of items from Beck et al.'s Imperatives (fifth) factor.

These results are consistent with data from other nonclinical samples. Cane et al. (1986), in their EFA of one of the short forms of the DAS using a student sample, obtained two factors. Cane et al.'s Performance

Table II. DAS Subscales (and their Coefficients Alpha) Suggested for Use with Undergraduate Populations

Factor I: Performance Evaluation ($\alpha = .88$)

47. If I fail at my work, then I am a failure as a person.
 39. If I do not do as well as other people, it means I am an inferior human being.
 51. If I do not do well all the time, people will not respect me.
 89. People will reject you if they know your weaknesses.
 73. People will like me even if I am not successful.
 45. My life is wasted unless I am a success.
 57. If someone disagrees with me, it probably indicates he does not like me.
 95. If a person I love does not love me, it means I am unlovable.
 59. I cannot be happy unless most people I know admire me.
 42. If I make a foolish statement, it means I am a foolish person.
 52. A person should think less of himself if other people do not accept him.
 35. If a person is not a success, then his life is meaningless.
 98. If I am to be a worthwhile person, I must be truly outstanding in at least one major respect.
 88. I am nothing if a person I love doesn't love me.
 76. If other people know what you are really like, they will think less of you.
 97. If a person asks for help, it is a sign of weakness.
 66. I cannot trust other people because they might be cruel to me.
 55. If I do well, it probably is due to chance; if I do badly, it is probably my own fault.
 85. Others can care for me even if they know all my weaknesses.
 28. It is shameful for a person to display his weaknesses.
 33. People who have good ideas are more worthy than those who do not.
 79. Whenever I take a chance or risk I am only looking for trouble.
 11. Turning to someone else for advice or help is an admission of weaknesses.
 2. People will probably think less of me if I make a mistake.
 49. If I don't set the highest standards for myself, I am likely to end up a second-rate person.
 91. I can reach important goals without slave driving myself.
 26. It is possible to gain another person's respect without being especially talented at anything.
 72. If you don't have other people to lean on, you are bound to be sad.
 37. Taking even a small risk is foolish because the loss is likely to be a disaster.
 38. It is not necessary to become frustrated if one finds obstacles to getting what one wants.
 80. If a person avoids problems, the problems tend to go away.
 7. I must be a useful, productive, creative person or life has no purpose.
 75. I should set higher standards for myself than other people.
 20. People should prepare for the worst or they will be disappointed.
 19. If a person is indifferent to me, it means he does not like me.

Factor II: Need for Approval ($\alpha = .78$)

48. I can enjoy myself even when others do not like me.
 94. A person doesn't need to be well liked in order to be happy.
 36. If others dislike you, you cannot be happy.
 12. If people consider me unattractive it need not upset me.
 54. My value as a person depends greatly on what others think of me.
 59. I cannot be happy unless most people I know admire me.
 50. I do not need other people's approval for me to be happy.
 72. If you don't have other people to lean on, you are bound to be sad.
 16. What other people think about me is very important.
 71. It is awful to be disapproved of by people important to you.
 46. If people whom I care about do not care for me, it is awful.
 14. I can be happy even if I miss out on many of the good things in life.

Table II. (continued)

1. I can find happiness without being loved by another person.
20. People should prepare for the worst or they will be disappointed.
Factor III: Imperatives ($\alpha = .70$)
56. A person should do well at everything he undertakes.
10. I should be happy all the time.
23. I should be able to please everybody.
99. I ought to be able to solve my problems quickly and without a great deal of effort.
44. I should always have complete control over my feelings.
100. To be a good, moral, worthwhile person, I must help everyone who needs it.
90. A person should be able to control what happens to him.
64. If I try hard enough I should be able to excel at anything I attempt.
31. A person should try to be the best at everything he undertakes.

Note. Item numbers are those of the original 100-item version (Weissman, 1979).

Evaluation factor contained items loading on Beck et al.'s first, third, and seventh factors; Cane et al.'s Approval by Other factor overlapped with Beck et al.'s second and ninth factors. Similarly, Oliver and Baumgart (1985), using nonstudent adults, obtained a Need for Approval factor which overlapped with Beck et al.'s second and ninth factors. Dyck's (1992) EFA of the long (100-item) form of the DAS, using Australian undergraduates, yielded a vulnerability factor which contained elements of Beck et al.'s first and seventh factors, and a Need to Succeed factor which combined portions of Beck et al.'s third and seventh factors. In addition, Dyck obtained a Catastrophizing factor which overlapped with Beck et al.'s second and ninth factors. Power et al. (1994) obtained a Dependency factor which overlapped with Beck et al.'s second and ninth factors and a Self-Control factor composed of items from Beck et al.'s fifth factor. To summarize, several EFAs of the DAS in nonclinical samples suggest that the factor structure of the DAS in nonclinical samples is less specific than the factor structure found by Beck et al. in their clinical population. Specifically, Beck et al.'s first, third, and seventh factors appear to cluster together, as do Beck's second and ninth factors. Beck's fifth factor appears to generalize across samples, as it was replicated in several of the studies.

Thus the results from the present and previous studies suggest that, for undergraduate samples, researchers should not expect Beck et al.'s (1991) first, third, and seventh factors to be differentiated from each other, nor should they expect significant separation between Beck et al.'s second and ninth factors. Thus, researchers who wish to use Beck et al.'s factors in student populations should consider constructing three subscales from Beck et al.'s nine factors. The first subscale (Performance Evaluation) would consist of Beck et al.'s first, third, and seventh factors; the second subscale (Need for Approval) would combine their second and ninth factors; and the third subscale (Imperatives) would replicate their fifth factor.

The proposed subscales and their coefficients alpha for the present sample are presented in Table II.

DISCUSSION

The present study examined whether the nine DAS subscales proposed by Beck et al. (1991) are appropriate for use in research using undergraduate students. CFA suggested that Beck et al.'s nine-factor model did not fit the student data very well. EFA of the student data corresponded with data from other nonclinical samples. Those data and the current EFA suggested combining some of Beck et al.'s nine factors into three subscales.

In nonclinical samples there appears to be less specificity in the factor structure of the DAS. In particular, for undergraduate samples, it appears that there is not sufficient differentiation among Beck et al.'s (1991) Vulnerability, Success-Perfectionism, and Avoidance of Appearing Weak factors for them to be retained as separate subscales. The present data and data from previous studies suggests these factors should be combined into one subscale. Similarly, a subscale combining their Need for Approval and Disapproval-Dependence factors appears to be appropriate for undergraduate samples. The proposed subscales are combinations of Beck et al.'s factors, rather than new ones constructed from the present EFA, since the results of any one factor analysis are limited in their generalizability. Several studies, including the present one, have consistently found that certain of the Beck et al. factors cluster together, and others do not appear at all. It is likely, therefore, that the proposed subscales, which reflect the consistencies among several studies, will generalize to other student samples.

A possible explanation for the finding that nonclinical samples produce factors which are less specific than do clinical samples is that, under normal circumstances, the DAS may not measure cognitive *vulnerability* to depression, but rather cognitive *symptoms* of depression. This may occur for one of two reasons. First, it may be that, either there is no cognitive vulnerability to depression, or that, even if it does exist, the DAS does not measure it. Others (e.g., Barnett & Gotlib, 1988b; Peselow, Robins, Block, Barouche, & Fieve, 1990) have found that persons who have recovered from depression have normal DAS scores, although they previously had scores in the dysfunctional range. Thus it appears that the dysfunctional beliefs measured by the DAS are present only during depressive episodes, and are not present otherwise, which is contrary to what cognitive theory would predict. However, Beck's more recent (1987) statement of the theory suggests that, although dysfunctional beliefs may be present in someone who is vulnerable to depression, they are not in the person's awareness,

except when the person is depressed. Thus, a second reason for the DAS's apparent inability to measure vulnerability could be that one's lack of awareness of these attitudes would result in one's responding to the DAS in a different way than would a depressed person, for whom these beliefs are quite salient. Research using negative mood induction suggests that such priming increases the accessibility of dysfunctional beliefs only for subjects who have a history of depression (Haaga, Dyck, & Ernst, 1991), which supports Beck's theory. It would be interesting to compare the factor structure of the DAS administered to subjects with induced negative mood with the factor structure of the DAS administered to subjects with no mood induction, both with and without a history of depression. If the more specific factors were found in subjects with a history of depression who were given negative mood induction, it would be further evidence that such specific dysfunctional attitudes exist, but are not in awareness unless they are primed. This would also give some indication as to whether such subjects respond to the DAS in the same manner as do clinical patients.

For both clinical and student samples the most robust factor appears to be Beck et al.'s (1991) fifth factor, Imperatives. Both the EFA conducted for this study and the EFA conducted by Dyck (1992) obtained this factor, without contamination by items found in Beck et al.'s other factors. This suggests that this factor may be retained for use in student populations. This further suggests that the dysfunctional beliefs measured by this subscale may be more in awareness when one is not depressed than are other beliefs measured by the DAS.

The three factors obtained in the present study's EFA accounted for less than 20% of the variance of the DAS. Similar EFAs by others have also resulted in fairly low amounts of variance accounted for. For instance, Power et al. (1994) accounted for 34% of the variance in their EFA of the two DAS short forms; Dyck's (1992) EFA of the long form accounted for 42% of the variance. [Beck et al. (1991) did not report how much variance their nine factors accounted for.] This suggests that using factor scores to summarize total DAS scores may not be appropriate. However, the purpose of the more recent factor-analytic studies has not been to develop factors which summarize the total DAS score. Instead of seeking to uncover the dimensions tapped by the DAS as a global measure of cognitive vulnerability, researchers have been using the DAS as a pool of items to draw from when constructing instruments to measure specific kinds of cognitive vulnerability. The ability to measure specific cognitive vulnerabilities is important to testing Beck's (1987) theory that such vulnerabilities interact with personality and environmental variables in the development and psychopathology. These findings suggest that researchers interested in using

DAS subscales in nonclinical populations should carefully assess whether the subscales are suitable for their samples.

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