

Construct validities and the empirical relationships between optimism, hope, self-efficacy, and locus of control

James Carifio^{a,*} and Lauren Rhodes^b

^a*UMASS-Lowell, Lowell, MA, USA*

^b*Brookside Hospital, Nashua, NH, USA*

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Abstract. This study assessed the construct validities and the relationships between Optimism [21], Hope [27], Self-Efficacy [18], and Locus of Control [12]. The validities and relationships between these scales were examined not only because they are to some degree rival constructs but also because there is an outstanding theoretical question in the literature of whether each of these variables is a state or trait variable or both. Snyder's Hope scale was the "know marker" trait-state scale in this study. Data were obtained on all scales from 78 at-risk university students and 22 regular (or normal) students, as all scales either make claims about or have existing data on these two different types of subjects. Other background data were also collected. A Manova on the 13 variables for which data were obtained found significant profile differences between the two groups of subjects as theory and the literature predicted at the 0.01 level. The trait-state two factor structure of Snyder's Hope scale was found except the structure was orthogonal in at-risk students as opposed to the oblique structure Snyder found in normals. The same strong results were obtained for Schiever and Carver's Optimism scale which additionally resolved an outstanding interpretability issue with this scale. Hypothesized factor structures were not obtained for the self-efficacy or the locus of control scales and both scales best fit the trait-state model, which contradicts Bandura's and other prevailing view of these two variables, but supports the results found by Bandalos et al. [2].

Keywords: Trait-state theory, at-risk patients and students, individual differences, outcome prediction

1. Overview

The Life Orientation (or Optimism) Test (LOT) was first developed by Scheier and Carver [20] to predict outcomes from both health and therapeutic treatments. The initial psychometric data on the LOT was good enough to start using it in clinical studies (see Scheier et al. [20,21]) and a variety of studies showed the broad beneficial health effects of optimism such as the recovery rates from heart attacks and the effectiveness of AIDS treatments. Other studies have shown that stu-

dents who are under academic stress achieve and cope better and are more successful in both the long and the short term if they are optimists rather than pessimists (e.g. [1]), and this finding has been replicated for patients doing short-term and time-limited therapy [20]. Further, all of these results are all the more remarkable as the LOT is just a 12 item scale with only 8 of the items actually being scored.

Although results using the LOT have been quite remarkable, the scale has drawn a great deal of scholarly commentary and questioning concerning its psychometric properties, construct definitions, and relationship to other variables such as Hope [27], Self-Efficacy [18] and Locus of Control [12], which are not only similarly defined, but also to some degree are rival

* Address for correspondence: James Carifio, 56 Dean St., Belmont, MA 02478, USA. Tel.: +1 617 484 9285.

hypotheses for Scheier and Carver's view of Optimism. Embedded in all of these expressed concerns is also the basic question of whether Optimism and Self-Efficacy are a state or trait variable (or both).

2. Purpose

The purpose of this study was to do a "known markers" factor analysis of the LOT Scale to better and more definitively assess the factor structure of the scale and to do a convergent and discriminant validity study [10] of the scale. Both "normal" and "at risk" subjects were used to ensure heterogeneity in the sample and to assess if results were different for these two subpopulations. The known marker test in this study was Snyder's Hope Scale (12 items) which has factor analytically validated trait and state subscales. A variety of correlations have been established between the Hope Scale and other variables ranging from self-esteem to personality, depression and problem solving ability. Lastly, a hotly debated point in the literature recently has also been whether Self-Efficacy is a State [5] or a Trait variable or both. The results of this study helped to answer this question also.

3. Methodology

Marginal At-Risk students ($N = 78$) who had been admitted into a special transitional program at a university in the Northeast were the first group of subjects from whom data were collected in this study. These students had a high school GPA of at least a 2.0 on a 4.0 scale, but their combined SAT scores did not meet the minimum requirement of 800 set by the university. Data were also gathered from a convenience sample of 22 regularly admitted students who were taking an introductory psychology course for a variety of comparative purposes.

Approximately 30% of the At-Risk and the sample of regular students were female and approximately 60% of the At-Risk students were minorities (Blacks, Hispanics or Asians) as compared to approximately 20% of the sample of regular students.

Both groups of students were administered the Scheier and Carver [20] Optimism Scale, Snyder's [27] Hope Scale, Owens and Forman's [18] Academic Self-Efficacy Scale, and Lefcourt's [12] Academic Locus of Control Scale in the order given here. Both groups of students were also administered a short background

questionnaire which had confidence and willing to learning subscales embedded within it of 4 items each that we developed as a cross check on the aforementioned scales. Given the relative brevity of these scales, all could be and were easily completed in a one hour sitting. The collection of data from these two groups of students established the baseline for a longitudinal study. Each of the scales used are described below.

3.1. Academic Self-Efficacy Scale

Owen's College Academic Self-Efficacy Scale (CASE) was developed by Owen and Froman [18]. This scale consists of 33 five point Likert items that are not hierarchically arranged as in other scales but rather are randomly mixed in terms of area and factors. The 33 items are specific classroom and academic behaviors whereby students assess how confident they are in performing the behavior in question on a scale that ranges from "very little" to "quite a lot". This scale was validated on 93 undergraduate students in terms of both reliability and validity.

The test-retest reliability coefficient over an 8 week period was $r = +0.85$. The internal consistency alpha coefficients were $r = +0.90$ and $r = +0.92$ on the test and re-test occasions. Factor analysis found 3 clear orthogonal factors that accounted for 78% of variance. These 3 factors were overt Social Situations (e.g., participating in class discussion), Cognitive Operations (e.g., listening carefully on a lecture of a difficult topic), and Technical Skills (e.g., using a computer).

3.2. Hope Scale

Snyder's et al. [27] Hope Scale measures one's generic confidence in being successful at life's tasks and in solving life problems. Hope is considered to be a generic personality trait comprised of agency (the trait component) and pathway (one's response repertoire and strategies, the state component). Snyder's Hope Scale, therefore, has 2 subscales.

Self-efficacy as defined by Bandura [5] would be a very narrow and focused subset of Snyder's Hope construct and focused on very specific beliefs and assessments of confidence in a narrowly defined domain. According to Snyder, low self-efficacy scores could be a result of low levels of hope and/or inadequate repertoires of strategies for solving problems.

Snyder's Hope Scale is a 12 item scale with 4 items directed at measuring Agency and 4 items directed at measuring Pathway. There are 4 filler items to break

response sets. Subjects respond to the statements on a 4 point forced choice scale that ranges from definitely true to definitely false. The 12 items on the scale winnowed from 45 items empirically in successive samples greater than 180 subjects. In the final 12 item scale, Cronbach alpha coefficients range from $r = +0.74$ to $r = +0.84$. Alphas for the Agency subscale range from $r = +0.71$ to $r = +0.76$, and alphas for the Pathway subscale range from $r = +0.63$ to $r = +0.84$. These are very high alphas for 4 item subscales and a 12 item instrument.

Test-retest reliability coefficients were $r = +0.85$ for a three week interval ($n = 130$) and $r = +0.73$ for an 8 week interval ($n = 115$). Two studies found R-tt coefficients of $+0.82$ for an interval greater than 10 weeks which is evidence to support Snyder's contention that hope is an enduring personality trait.

Factor analysis revealed 2 oblique factors that accounted for 63% of variance in the sample ($n = 284$). In general, Agency items loaded highly on factor 1, but not factor 2, and Pathway items loaded highly on factor 2, but not factor 1. Empirically, path strategies are not statistically independent of hope levels and the correlation between these 2 factors ranged between $+0.39$ and $+0.57$ over nine different samples. These findings were replicated over 8 different samples of subjects ranging from students and employees in academic environments and people seeking help in stress centers and state hospitals. A convergent and discriminant validity study was also done correlating Snyder's Hope scale to over a dozen other scales including Rosenberg's Self-Esteem Scale, Beck et al. Hopelessness Scale, the MMPI, Rotter's Incomplete Sentence Blank, Fibel and Hale's Generalized Expectancy for Success Scale, and Heppner and Petersen's Problem Solving Inventory which also measures the subject's confidence in their ability to solve the problems on this scale.

In general, the patterns of positive and negative correlation coefficients across these many tests were as expected and ranged between $r = +0.5$ and $r = +0.75$ indicating strong relationships. In particular, the Hope Scale had a high inverse relationship with Beck's Depression Inventory ($r = -0.51$) and the Problem Solving Inventory ($r = -0.62$). Snyder's Hope Scale, therefore, is a good predictor of problem solving confidence and academic success.

People with high hope scores reported less severe psychological problems and a more positive outlook concerning problems in their lives as measured by the MMPI. Scores on the Snyder Scale had low correlation with measures of tendencies to give socially desirable

responses. People with high hope scores tended to have better academic achievement, more goals for their life, and preferred difficult goals and complex task as compared to subjects with low hope scores. Subjects with high hope scores also tended to report greater confidence in their ability to solve problems and a broader range of problem solving skills.

Snyder's Hope Scale is the "known marker variable" in this study. The evidence for the reliability and validity of the scale is excellent, as is the evidence to support Snyder's contention that hope, as he defines it, is a generic disposition that may be a more powerful determiner of motivation, behavior, and persistence than the more narrowly defined and circumscribed self-efficacy variable. Snyder's work also strongly suggests that Life Orientation (or Optimism) may also be more powerful than situational motivation and beliefs.

3.3. Life Orientation Test (Optimism)

Scheier and Carver's [20] Life Orientation Test (LOT) is a 12 item 5 point (from strongly agree to strongly disagree) Likert scale. The scale has 4 filler items to break response set and 4 of the 8 items that are used to derive a life orientation score are reverse scored. The LOT scale measures one's general optimism relative to dealing with the vicissitudes of daily life and one's ability to and belief that one can cope with these vicissitudes. The LOT scale seems to assess also how energized and proactive the respondent is relative to being in charge and dealing with the vicissitudes of his/her daily experiences.

The scale is different from the Hope Scale in that one can be hopeful but not optimistic, a condition often seen in subjects with high external locus of control and one can be optimistic without necessarily having high levels of hope. The LOT scale, therefore, assesses a feature of the "possible self" component in the Borkowski and Muthukrisna model [9].

The test-retest reliability coefficient over a 4 week period for a sample of 240 undergraduates was $r = +0.79$. Cronbach alpha was $r = +0.76$. Both of these reliability measures are quite good for what is essentially an 8 item scale. Principle component factor analysis of the scale using a sample of 624 undergraduate men and women reveal two oblique factors that accounted for 56% of the total variance. Scores on the LOT scale were positively associated with self-esteem scores particularly in women and negatively associated with depression and personal and social alienation scores.

Table 1
Multivariate comparison of at-risk to regular university subjects on basic study variables ($N = 100$)

Variables	Study subjects ($N = 78$)		Regular subjects ($N = 22$)		F	p
	Mean	St. Dev.	Mean	St. Dev.		
<i>Background</i>						
Math SAT	447.2	94.4	497.1	88.7	10.1*	< 0.002
Verbal SAT	437.2	73.4	472.4	95.4	2.8*	< 0.09
GPA2	1.6	0.8	2.9	0.6	40.0*	< 0.000
<i>Pre-Questionnaire</i>						
PreSC (confidence)	7.4	1.4	8.5	1.8	5.9*	< 0.02
PreWL (willingness to learn)	7.4	1.5	7.5	2.0	1.1	> 0.05
<i>Locus of Control</i>						
PreLC1: Effort	24.6	3.4	25.3	3.2	0.7	> 0.05
PreLC2: Ability	20.9	4.0	20.1	2.4	0.6	> 0.05
PreLC3: Situation	19.9	4.5	18.4	4.1	1.4	> 0.05
PreLC4: Luck	17.6	4.6	16.0	4.2	1.4	> 0.05
<i>Hope</i>						
PreAG: Will	11.6	2.3	13.0	1.6	5.7*	< 0.02
PrePATH: Way	12.4	2.3	13.5	1.2	3.5*	< 0.06
<i>Optimism</i>						
PreOPT	24.8	6.1	28.4	5.2	4.9*	< 0.02
<i>Confidence</i>						
PreSE: Self-Effic.	99.3	15.3	118.0	18.5	19.6*	< 0.001
Multi-F ($df = 13, 86$)					5.34*	< 0.01

* = $p < 0.05$.

3.4. Multidimensional-Multiattributonal Causality Scale (Achievement Locus of Control)

Lefcourt's et al. [12] Multidimensional-Multiattributonal Causality Scale (MMCS) is a 24 item 5 point (agree to disagree) Likert Scale that measures 4 factors to which a student may attribute her or his success or failure on school tasks [12]. These four factors are ability (aptitude), effort, context, and luck. Each factor is measured by 6 items with 3 items reflecting attribution to the factor for success and 3 items reflecting attributions to the factor for failure. A student's profile on these 4 factors describe the degree to which a given student perceives his performance to be due to internal or external control factors. Lefcourt's scale has the advantage over other locus of control scales since it is focused solely on academic performance.

The test-retest reliability coefficient for 241 undergraduates for intervals ranging from 1 week to 4 months for the Multidimensional-Multiattributonal Causality Scale were 0.51 to 0.62. The Cronbach alphas for the 4 subscales ranged from 0.58 to 0.81. The intercorrelations between the 4 subscales were non-significant with the exception of the luck subscale which positively correlated with ability and situation and inversely correlated with the effort subscale. The correlations were

moderate ranging from $r = -0.24$ to $+0.48$. The subscales, therefore, are independent with the exception of the luck subscale.

Scores on the Multidimensional-Multiattributonal Causality Scale moderately correlated ($r = +0.52$) with scores on Rotter's Locus of Control Scale for 75 university undergraduates. Scores on the ability subscale correlated positively with grade point average ($r = +0.46$) and several other predictive and concurrent studies were also supportive of the validities of Lefcourt's scale.

4. Results

Table 1 presents the results of a 2×13 MANOVA comparing the At-Risk students in this study to the group of regular students from whom data were collected. As can be seen from Table 1, the At-Risk students were significantly lower than the group of regular university students on all background variables (Math SAT, Verbal SAT and GPA) and 5 of the 10 target variables (Multi-F = 5.34, $df = 13, 86$, $p < 0.01$). The At-Risk students in this study had significantly lower ability and prior achievement scores than the group of regular students and were significantly less confident,

hopeful and optimistic, than the regular students. The difference in academic self-efficacy levels were very significant ($p < 0.001$) and the two groups differed by almost a whole standard deviation. At-Risk students were very much less confident in their capabilities to do academic work than regular students. However, no significant differences between the two groups were observed on any of the academic Locus of Control Subscales which was somewhat contrary to expectation and will be discussed later. The findings presented in Table 1 support the contention that the At-Risk Students in this study were At-Risk and quite different from the regularly admitted students at this university.

The internal consistency coefficient for each scale and subscale was approximately the same as reported by the scale's developer for both the At-Risk and Regular student samples. The samples in this study, therefore, were similar to those in the several studies reported above.

4.1. Factor structures

Table 2 presents the rotated factor structure for Snyder's [27] Hope Scale for At-Risk ($N = 78$). Principal components analysis with unities in the diagonals, varimax rotation and an eigen cut-off value of 1.0 was used as the method of factor analysis for the results presented in the results presented in Table 2. As can be seen from Table 2, two clear factors were obtained that accounted for 60% of the variance. The first factor was the 4 items that constituted the Agency subtest of the scale, whereas the second factor was the three items that constituted the Pathway subscale with the other Pathway item (item 6) being double loaded on both factors. Snyder [27] had the same findings for item 6 in eight different samples as found in this sample. The Agency factor accounted for 44% of the common variance, whereas the Pathway factor account for 16% of the common variance. The factor structure was the same when the regular students from whom data were collected was added to the sample ($N = 100$).

Snyder [27] found two moderately oblique factors for the Hope Scale ($N = 3.615$) that account for 63% of the variance in 8 different samples. The two factors correlated with each other at $r = +0.50$ (on the average) when simple sum scores were used. In the present study, the two factors correlated at $r = +0.50$ when simple sum scores were used. The two factors, however, are strongly orthogonal in the sample of At-Risk students in this study as opposed to correlated (oblique) as Snyder found in his sample which was more reflec-

Table 2
Rotated factor structure for Snyder's Hope Scale for the study of at-risk students ($N = 78$)

Items*	Agency	Hope	h2
Item 1	0.11	0.83*	0.69
Item 2	0.72*	0.26	0.57
Item 4	0.16	0.68*	0.49
Item 6	0.51*	0.42*	0.43
Item 8	0.18	0.79*	0.61
Item 9	0.72*	0.29	0.77
Item 10	0.88*	0.09	-
Item 12	0.74*	0.03	0.55
Common variance	44%	16%	60%

Items 3, 5, 7 and 11 are filler items on this scale and are not scored.
* = $p < 0.01$.

tive of the population in general. The At-Risk students in this study had significantly lower pre-Agency and pre-Pathway scores than the group of regular students ($N = 22$) from whom data were collected (see Table 1) and their scores were also significantly lower than the mean levels reported by Snyder on his 3.615 regular subjects at the $p < 0.01$ level. However, their scores were not significantly different from the 206 clinical patients from whom data were on the scale, whereas the scores of the sample of regular students ($N = 22$) in this study were higher but not significantly higher than the 3.615 regular subjects Snyder used in the 8 samples from whom data were collected on this instrument. At-Risk students, therefore, are not only significantly less Hopeful than other students, but, unlike other students, their Agency (Will) and Pathway (Way) scores are independent and unrelated to each other unlike other students. This finding means that there is not a direct or automatic linkage between Will and Way for these students and that focusing on either of these two variables alone will not automatically produce change in the other. For At-Risk students, then, both Will and Way must be worked on specifically and together.

Two points should be recalled at this time. The first is that scores on Snyder's Hope Scale inversely correlate with scores on Beck's Depression Inventory ($r = -0.51$). Given the finding that At-Risk students in this study were not significantly different from the clinic subjects in Snyder's study, many At-Risk students in this study would be more than likely classified as clinically depressed, which supports the clinical observations of many academic counselors and faculty who work closely with these At-Risk students in general.

The second point that needs to be recalled is that Snyder [27] identified the Agency subscale as the measure of the trait component of Hope. Snyder's classification of the Agency subscale as a trait measure was based in

Table 3
Rotated factor structure for Scheier and Carver's (1985) optimism scale for the study sample of at-risk students ($N = 78$)

Items	Success expectancy	General optimism	h ²
1. In uncertain times, I usually expect the best.	-0.12	0.73*	0.54
3. If something can go wrong for me, it will.	0.77*	-0.20	0.63
4. I always look on the bright side of things.	-0.39	0.71*	0.64
5. I'm always optimistic about my future.	-0.39	0.73*	0.68
8. I hardly ever expect things to go my way.	0.83*	-0.13	0.71
9. Things never work out the way I want them to.	0.79*	-0.28	0.69
11. I'm a believer in the idea that "every cloud has a silver lining".	-0.13	0.75*	0.59
12. I rarely count on good on good things happening to me.	0.73*	-0.34	0.66
Common variance	51%	14%	64%

Items 2, 6, 7, and 10 are filler items on this instrument.

* = $p < 0.01$.

part on theory and in part on empirical results; namely, that the Agency subscale correlated most highly with the trait measures Snyder included in the convergent and discriminant validity study of his instrument that he did. This point is important as it means that the Agency subscale is a known trait marker, and this fact will be important in interpreting the meaning of various correlations and factor structures reported below.

Table 3 presents the rotated pre-test factor structure ($N = 78$) for Scheier and Carver's [20] Optimism Scale. Principal components analysis with unities in the diagonals, varimax rotation and an eigen cut-off value of 1.0 was used as the method of factor analysis for the results presents in Table 3. As can be seen from Table 3, two orthogonal factors were found that account for 64% of the variance. The results presented in Table 3 are numerically identical item by item to those found by Scheier and Carver for a sample of 624 undergraduates with the exception that Scheier and Carver found two oblique factors that accounted for 56% of the variance.

Scheier and Carver [20] maintained that the two factors they found in their studies were related to "item mechanics"; namely, those items that formed the first factor were all "positive" statements and those items that formed the second factor were all "negative" statements. This view of their results is what had them recommend using a one "simple sum" total score for the instrument. However, a closer examination of these items reveals that all of the items that load on factor one are related to expectancy of success (success expectancy), whereas all of the items that load on factor two are related to general Optimism. It is, therefore, our opinion that there are two factors or subscales for Scheier and Carver's Optimism Scale that make substantive and theoretical sense. Consequently, the Optimism Scale was analyzed in terms of both total test and subtest scores.

Table 4
Eigen values and percentages for Owen's College Academic Self-Efficacy Scale

Factor	Eigen value	Percent	Cumulative percent
1	9.23	28.0	28.0
2	2.94	8.9	36.9
3	2.28	6.9	43.8
Skree point of plot flattening curve			
4	1.68	5.1	48.9
5	1.59	4.7	53.6
6	1.30	3.9	57.5
7	1.24	3.8	61.3
8	1.19	3.6	64.9
9	1.16	3.5	68.4
10	1.01	3.1	71.5

The factor structure was the same when the regular students ($N = 22$) were included in the analyses. This findings further support our interpretation of the factor structure for the Optimism Scale presented in Table 3.

Owen's [18] College Academic Self-Efficacy Scale was factor analyzed using principal components analysis with unities in the diagonals, varimax rotation and an eigen cut off value of 1.0. Ten (10) factors were extracted that accounted for 71.2 percent of the variance. This result is quite different from Owen's reported results of 3 factors that accounted for 78% of the variance. The difference in these two results may in part be due to differences in sample size and student type (i.e., Regular versus At-Risk students). This is to say that part of the nature of cognitive self-efficacy schemas for At-Risk students may be that they are over-differentiated and ungeneralized (i.e., highly specific and different in character from instance to instance and type to type) with no unified and underlying factors. The internal consistency coefficient observed on this scale for At-Risk students, however, would indicate that this is most probably not the case here ($r = +0.91$) and a different explanation should be considered.

Using the Skree criteria and plotting the eigen values (see Table 4 for details), there were really only 3

Table 5
Rotated factor structure for Lefcourt’s Academic Locus of Control Scale for the study sample of at-risk students ($N = 78$)

Item	I	II	III	IV	V	VI	h2
1. Effort/F	0.17	0.08	-0.36	-0.39	-0.03	0.29	0.39
2. Ability/F	0.00	-0.14	0.72*	0.17	-0.20	0.37	0.54
3. Sit. /S	0.69*	-0.01	-0.09	0.31	-0.06	0.03	0.43
4. Luck/S	0.69*	0.00	0.00	0.09	0.04	-0.40	0.50
5. Effort/S	-0.49	0.39	-0.30	0.04	0.23	0.35	0.54
6. Ability/S	0.04	0.70*	0.00	0.00	0.00	0.04	0.43
7. Sit. /F	0.15	0.04	0.07	0.72*	0.10	-0.13	0.45
8. Luck/F??	0.55*	0.14	0.04	0.35	0.28	0.21	0.49
9. Effort/F	0.10	0.09	-0.45	-0.21	-0.12	0.34	0.39
10. Ability/F	0.25	0.18	0.70*	-0.11	0.09	-0.07	0.57
11. Sit./S	0.69	-0.06	0.08	-0.05	0.24	0.16	0.56
12. Luck/S	0.52*	0.12	0.02	-0.07	0.45	-0.21	0.42
13. Effort/F	0.09	0.13	-0.09	-0.23	-0.23	0.73*	0.52
14. Effort/S	-0.30	0.36	-0.09	-0.35	0.01	0.48	0.53
15. Ability/S	0.12	0.66	0.14	0.03	0.09	0.40	0.63
16. Sit/F	0.09	0.11	0.00	0.71	-0.01	-0.12	0.39
17. Luck/F	0.16	0.24	0.02	0.17	0.73*	-0.16	0.44
18. Ability/F	0.20	0.29	0.55*	0.19	0.16	0.13	0.50
19. Sit./S	0.67*	-0.13	0.24	0.17	0.06	0.11	0.51
20. Luck/S	0.50*	0.08	0.36	-0.13	0.36	-0.24	0.52
21. Effort/S	0.05	0.47*	-0.59*	0.08	0.07	0.09	0.47
22. Ability/S	-0.01	0.68*	0.00	0.10	-0.02	-0.04	0.58
23. Sit./F	0.22	-0.19	0.01	0.56*	0.45*	0.03	0.41
24. Luck/F	0.09	-0.44	0.19	0.09	0.67*	0.01	0.31
	20.8%	10.8%	8.2%	7.9%	5.8%	5.0%	58.5%

Scale items are labeled in terms of the subtest they belong to and the type of attribution made in the item (S for Success and F for Failure).

* = $p < 0.01$.

distinct and well-defined factors for the scale which account for only 43.8% of the variance, which is 34% less variance than accounted for by Owen’s results. Of these three factors, only the first is a substantial factor which accounts for 28% of the variance. An oblique factoring of the data confirmed these results and showed that the 3 factors were moderately correlated and the remaining seven were “fractured” pieces of the first three and primarily represented most likely joint and specific variance effects. Owen’s recommendation of using a total score for his scale, therefore, is a sound recommendation and was followed in this study.

It should be well noted that factor analysis is only one criteria for assessing a scale’s validity and lack of a simple factor structure does not mean that a scale is invalid. The underlying construct may be factorially complex, and the scale may have been constructed to sample the complexity of a given domain which seems to be the case with the Owen’s scale. Further, from a multi-trait/multi-method point of view [10], a scale may have an acceptable pattern of correlations with other scales which would be indicative of its basic validity. Final judgment of the quality and validity of the Owen’s scale, therefore, must be postponed until later

when instrument intercorrelations are reported and discussed. However, it should be noted that the initial 10 factors and subsequent results observed strongly supports one aspect of Bandura’s [7] view of self-efficacy. Bandura views self-efficacy as being factorially complex and tied very narrowly to very specific areas and specific instances of performance in a given area. In factor analytical terms, self-efficacy for Bandura is primarily specific as opposed to common or joint variance. In this respect, then, Owen’s scale empirically meets Bandura’s specifications for At-Risk students, although meeting this specification does not seem to be intentional.

Table 5 presents the rotated pre-test factor structure for the 24 items of Lefcourt’s Academic Locus of Control Scale for the subjects in this study ($N = 78$). Principal components analysis with unities in the diagonals, an eigen cut off value of 1.0 and varimax rotation was the method of factoring employed to produce the results presented in Table 5. Table 5 presents the first factor analysis done of the Lefcourt scale (to the best of our knowledge). As can be seen from Table 5, 6 factors which accounted for 58.5% of the variance were found. The Lefcourt scale, it will be recalled, had 4 subtests

Table 6
Four factor oblique structure matrix for Lefcourt's Academic Locus of Control Scale for the Study sample of at-risk students ($N = 78$)

Item*	Situation/Luck	Effort/Ability	Effort	Ability/Effort
1. Effort/F	0.06	0.00	0.53	-0.32
2. Ability/F	0.00	0.00	0.01	0.72
3. Sit. /S	0.65	0.00	-0.16	0.00
4. Luck/S	0.67	-0.21	-0.27	0.00
5. Effort/S	-0.38	0.57	0.10	-0.36
6. Ability/S	0.00	0.65	0.00	0.00
7. Sit. /F	0.28	0.04	-0.65	0.05
8. Luck/F	0.66	0.19	-0.25	0.07
9. Effort/F	0.00	0.17	0.46	-0.43
10. Ability/F	0.29	0.09	-0.11	0.71
11. Sit./S	0.72	0.00	0.00	0.15
12. Luck/S	0.64	0.03	-0.20	0.00
13. Effort/F	0.04	0.31	0.65	-0.07
14. Effort/S	-0.33	0.51	0.51	-0.11
15. Ability/S	0.06	0.77	0.15	0.10
16. Sit/F	0.18	0.11	-0.60	0.00
17. Luck/F	0.45	0.25	-0.48	0.00
18. Ability/F	0.32	0.22	-0.38	0.54
19. Sit/S	0.67	-0.15	-0.12	0.29
20. Luck/S	0.60	0.00	-0.21	0.39
21. Effort/S	0.08	0.49	0.10	-0.62
22. Ability/S	0.01	0.62	-0.11	0.00
23. Sit/F	0.43	-0.10	-0.56	0.01
24. Luck/F	0.35	-0.35	-0.35	0.21
	20.8%	10.8%	8.2%	7.9%
Factor Correlations				
	F1	F2	F3	F4
F1	1.0	-0.04	-0.24	0.12
F2		1.0	0.04	0.08
F3			1.0	-0.14
F4				1.0

*Scale items are labeled in terms of the subtest they belong to and the type of attribution made in the item (S for Success and F for Failure).

which were attributions of success and failure to Effort, Ability, Situation and Luck. Each item in Table 5, it should be noted, is labelled in terms of the subtest to which it belongs and the type of attribution made in the item (S for Success and F for Failure).

Inspection of Table 5 will show the reader that the Situation and Luck subscales are merged into one factor (namely, the first factor labeled "I") that accounts for the most variance (20.8%) with a "subfactor" (IV), as opposed to a true orthogonal factor. This result indicates a "set-subset" relationship between factors. Further, the Effort and Ability subscales constitute two correlated factors (II and III) with "subfactors" (V and VI). It is also important to note that the negative factor loading also serve to define factors. For example, item 4 (Luck) positive loading of Factor I (Luck/Situation) and negative loading on Factor VI (Effort/Ability) indicates that the scale is working as intended and such patterns of relationships are predicted by the scale's constructs.

As Table 5 shows, Lefcourt's scale does not have a "simple and clean" factor structure that empirically supports its hypothesized structure in a direct fashion. The reason that this is the case is mostly probably due to the procedures used by Lefcourt to construct the scale. In constructing his scale, Lefcourt purposefully chose to have items that represented attribution of success to a given factor (e.g., Effort) and attributions of failure to the factor so that both ends of the continuum and views were measured and represented in the scale's scores. This choice was a logical/theoretical choice that implemented a logical point and aspect of the construct as opposed to empirical/mathematical aspects. Part of the pattern observed in Table 5, therefore, is due to the items being either positive or negative "attributions" and this response format characteristic is an intervening variable that is adding "noise" to the scales factor structure.

The other factor influencing the factor structure observed in Table 5 is that Lefcourt's four (4) hypoth-

Table 7
List of Variable Acronyms

Variable	
MSAT	Math Scholastic Aptitude Test Scores
VSAT	Verbal Scholastic Aptitude Test Scores
GPA2	Grade Point Average Fall 1995
<i>Locus of control</i>	
PreLC1	Pre-test Locus of Control Effort
PreLC2	Pre-test Locus of Control Ability
PreLC3	Pre-test Locus of Control Situation
PreLC4	Pre-test Locus of Control Luck
<i>Hope</i>	
PreAG	Pre-test Agency (Hope "Will")
PrePath	Pre-test Path (Hope "Way")
<i>Optimism</i>	
PreOPT	Pre-test Optimism
<i>College academic self-efficacy</i>	
PreSE	Pre-test Self-Efficacy

Table 8
Correlations between variables for at-risk students (N = 78)

	Effort PreCl1	Ability PreCl2	Luck PreCl3	Situation PreCL4	PreAg	PrePath	PreOpt	PreSE
PreLC1	1.0	0.04	-0.34*	-0.36*	-0.04	-0.01	0.04	-0.27*
PreLC2		1.0	0.11	0.15	0.13	0.09	-0.13	-0.01
PreLC3			1.0	0.58*	0.00	0.03	0.02	0.04
PreLC4				1.0	-0.05	0.04	0.00	-0.13
PreAg					1.0	0.46*	0.52*	0.35*
PrePath						1.0	0.13	0.08
PreOpt							1.0	0.26*
PreSC	-0.05	-0.22	0.00	-0.02	0.32*	0.06	0.38*	0.37*
MSAT	-0.03	-0.14	0.20	0.14	-0.12	0.17	0.03	0.00
VSAT	-0.09	-0.30*	0.06	-0.04	-0.05	0.16	0.06	0.11

r MSAT/VSAT = 0.50*

* = p < 0.01.

esized subscales are not empirically independent and distinct from each other for this sample of At-Risk students and are in fact correlated. This point is seen in Table 6 which presents a four factor oblique structure matrix for Lefcourt’s scale. The points made above about the interpretation of the factor structure in Table 5 can be seen more clearly in Table 6, particularly those relative to the negative “defining” factor loadings and the negative correlations between factors. That the two factors in Table 6 that most define Effort (III and IV) are inversely correlated with the Situation/Luck factor (I) is solid evidence for the scale’s basic validity as mentioned previously.

The oblique factor structure presented in Table 6 actually supports one of Lefcourt’s recommended scoring procedures for and interpretations of this scale. Lefcourt recommends combining the scores of the Situation and Luck subscales into one score that represents an External Orientation or External Locus of Control

and combining the Effort and Ability subscales into one score that represents an Internal Locus of Control and then subtracting the External Score from the Internal Score to get an overall Locus of Control Score. The results presented in Table 6 strongly support this view and scoring procedure as they clearly show that Situation and Luck are essentially one factor and that Effort and Ability are roughly one factor that mostly define by Effort.

4.2. Convergent and discriminant correlations

Table 7 presents the full name for each of the variable abbreviations used in Tables 8, 9 and 10. Table 8 presents the correlations between the variables scrutinized for At-Risk students (N = 78). As can be seen from Table 8, subjects who believe academic achievement is due basically to situational factors and luck rate effort low as a cause for success or failure on

Table 9
Correlations between variables for regular students ($N = 22$)

	Effort PreCl1	Ability PreCl2	Luck PreCl3	Situation PreCL4	PreAg	PrePath	PreOpt	PreSE
PreLC1	1.0	-0.39	-0.37	-0.31	0.08	0.00	0.28	0.09
PreLC2		1.0	0.40	0.30	-0.20	0.06	-0.13	-0.05
PreLC3			1.0	0.71*	-0.18	0.09	-0.11	-0.06
PreLC4				1.0	-0.21	0.07	-0.43*	-0.02
PreAg					1.0	0.60*	0.67*	0.49*
PrePath						1.0	0.56*	0.45*
PreOpt							1.0	0.58*
PreSC	0.22	-0.17	0.26	-0.30	0.74*	0.40	0.66*	0.38*
MSAT	-0.22	0.15	0.30	-0.06	0.19	0.53*	0.03	0.25
VSAT	-0.14	-0.16	0.15	0.09	0.39	0.46	0.23	0.37

$r = \text{MSAT/VSAT} = 0.64^*$

* = $p < 0.01$.

Table 10
Rotated pre-test factor structure of the dependent variables for study subjects ($N = 78$)

	I	II	III	h2
PreSC (Self-Confidence)	0.75*	0.03	-0.27	0.63
PreLC1 (Effort)	-0.18	-0.70*	0.10	0.53
PreLC2 (Ability)	-0.29	0.14	0.62*	0.49
PreLC3 (Sit.)	0.00	0.81*	0.09	0.66
PreLC4 (Luck)	-0.12	0.83*	0.10	0.71
PreAg (Hope)	0.66*	0.06	0.61*	0.80
PrePath (Hope)	0.16	-0.02	0.76*	0.60
PreOpt (Optimism)	0.75*	-0.12	0.15	0.59
PreSE (Self-Efficacy)	0.69*	0.20	0.02	0.52
	25.1%	21.3%	15.1%	61.2%

* = $p < 0.01$.

school tasks, as would be expected from theory. Situations and Luck were highly correlated ($r = +0.58$). This result was also observed in the sample of regular students for whom data were collected (see Table 9). These two subscales of Lefcourt's instrument greatly overlap and are not as different as he hypothesized. In fact, situational factors could be construed as being a particular type of luck as opposed to luck in general.

Lefcourt found that Ability positively correlated with Situation and Luck, which was not found in this study. Lefcourt found that Luck and Situation correlated positively and that both correlated negatively with Effort which was also found to be the case in this study.

Table 8 shows that Hope (Agency and Pathway), Optimism, and College Academic Self-Efficacy are positively correlated at the $p < 0.01$ level but uncorrelated to Academic Locus of Control. Even more positive correlations between these three variables were observed in the sample of Regular students (see Table 9) where again the 3 were uncorrelated with Academic Locus of Control. The relationship between Hope and Optimism was hypothesized by us and is confirmed by the data

presented in Tables 8 to 10. These two variables were also hypothesized to be basically "trait" as opposed to "state" variables. The lack of correlation between Academic Locus of Control and Hope and Optimism support this contention and it will be recalled that the Agency subscale of the Hope Scale is the validated trait marker variable (see [27]). Therefore, the correlation between the Hope and Optimism scales and Owen's College Academic Self-Efficacy scale means that self-efficacy is not a pure "state" variable as proposed in the literature of this variable over the past 10 years.

There is a "trait" component to Academic Self-Efficacy as the data in Tables 8 to 10 show. This point is further supported by factor analyzing this set of variables. Table 10 presents the rotated factor structure for the dependent variables in this study using principal component analysis with unities in the diagonals, varimax rotations and eigen cut-off value of 1.0. As can be seen from Table 10, Academic Self-Efficacy, the Agency subscale of the Hope scale and Optimism form the first factor, which is correlated to the third factor that is defined by the Pathway subtest of the Hope Scale

and the Ability subtest of the Academic Locus of Control Scale. The second factor is the Effort, Situational factors, and Luck subtests of the Academic Locus of Control scale with the signs of the alpha loadings as they should be. All three factors account for about the same amount of variance with the 3 factors accounting for 62.5% of the variance.

It should also be noted that the Agency subtest of the Hope Scale (the known trait marker) has the highest communality (common variance) of all the variables in the set. It should also be noted that the present study (to the best of our knowledge) is the first instance of external convergent and discriminant validation of the Owen's Scale and the Self-Efficacy construct.

All of the above data says that the behaviorist model of Self-Efficacy originally proposed by Bandura and perpetuated in the literature is not a correct theoretical model for this variable. The more accurate theoretical model is the trait/state model Spielberger proposed for anxiety and which has been used for many other variables such as shyness and self-concept. This model says that there are people who are in general confident but lack confidence in certain situations and about certain things and vice-versa. The factor analytical and correlational results presented here not only strongly support this contention, but they also add to and cross-validate the same results that were observed by Bandalos et al. [2] when they factor analyzed self-concept and self-efficacy items. The evidence to support the trait/state view of self-efficacy we propose for this variable is very strong and compelling.

All of the above data also say that Scheier and Carver's Life Orientation (i.e., Optimism) Scale and Snyder's [27] Hope Scale are independent and complimentary constructs and that each of these scales is highly valid with broad ranges of clinical and academic predictive powers. As these two scales are only a dozen items each, we believe that they should be used more by educational, health and clinic researchers and practitioners as should the two constructs themselves. Hope and optimism are not two words that one hears a lot these days and maybe we should be more focused on these two old fashion words and ideas in the coming decade given the results of this study and many others.

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