Creation and Initial Validation of an Instrument to Measure Academic Resilience

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It is generally believed that resilience—definable as being inordinately unaffected by stress and/or barriers—may be an important ingredient in academic success (e.g., Bauman, 2002; Bell, 2001; Meyer and Farrell, 1998). Resilience research has yielded important advances in understanding and policy improvements. Research into resilience has led to beneficial changes in school policies (e.g., Bauman, 2002; Bell, 2001; Meyer and Farrell, 1998). It has, for example, led to the advocacy of better integration of the school with the community (Freiberg, 1994; Gordon and Wang, 1994; Sanders and Epstein, 2000; Wang, Haertel, and Walberg, 1994), the creation of more effective educational programs (McClendon, Nettles, and Wigfield, 2000), and more efficient improvement of inner-city schools (Anderson, 1994; Wang and Walberg, 1996). These gains have come through deeper understandings of the needs, limits, and abilities of adolescents and the factors that facilitate and impede their intellectual and psychological growth (Balfanz, 2000; Franklin, 2000; Wang, Haertel, and Walberg, 1994) In addition, if found to be a valid and universal construct, the concept of resilience may help people in general to attain higher levels of mental health and productivity.

Despite much conjecture, the causes of resilience have not been discerned. For example, there is no consensus about the extent to which resilience is genetic or learned. Some writers (e.g., Masten 1994; Masten, Best, and Garmezy, 1990) tend to attribute resilience to the influence of the environment, viewing it as the successful adaptation to and recovery from exceptionally disadvantaged situations, be they internal perturbations or exogenous stressors. Other writers (e.g., Block and Kremen, 1996; Werner, 1984; Werner and Smith, 1992) view resilience as a trait (likely an unlearned one) that some children have, with only those exposed to stressors actually displaying the trait and thus being labeled "resilient."

It appears that one reason for this lack of consensus is that assessments of resilience are typically subjective; resilience is poorly or differentially operationalized (Luthar, Cicchetti, and Becker, 2000). In fact, resilience as yet has no standard definition. The original definition of resilience in this field (Garmezy, 1974)—the largely unexpected recovery of normal psychological functioning after severe trauma—is itself rather broad, and yet resilience has come to include many other concepts (Cicchetti and Garmezy, 1993; Gordon and Wang, 1994). Often, those individuals the researchers deem as having succumbed less than expected to whatever risk factors they happen to be studying are grouped together as resilient. The list of populations given above provides an overview of the different factors against which resilience has come purportedly to protect. What counts as "not succumbing" and even what should be considered as a risk factor vary from researcher to researcher. In addition, what one researcher establishes as the definition of resilience (e.g., a successful marriage) may be regarded by another researcher as causing resilience. Sometimes a rather objective criterion is used (e.g., level of academic success given certain risk factors such as perinatal complications), but there is yet no universal acceptance of a standard criterion (Bartelt, 1994; Liddle, 1994). Resilience is typically defined by an *ad hoc* composite of some of the various elements commonly considered to contribute to resilience (e.g., Finn and Rock, 1997; Masten, Hubbard, Gest, Tellegen, Garmezy, & Ramirez, 1999; Rouse, 2001; Steca, Alessandri, Vecchio, and Caprara, 2007; Somchit & Sriyaporn, 2004).

Recently, there have been about a handful of efforts to operationalize resilience with self-report instruments in various settings or within certain populations. Ahren, Kiehl, Sole, and Byers (2006) outline the extant resilience instruments they could find. Of these, two have undergone little or no use after their initial creation, two are focused on mental health (e.g., PTSD) populations, one has been used only in a few studies in Japan, and the last is directed towards immigrant populations. In addition to this excellent review can be added two more instruments of which we are aware: the Polk's (2000) Polk Resilience Patterns Scale (PRPS) and the Resiliency Attitudes and Skills Profile (Hurtes and Allen, 2001). The PRPS is a currently unpublished instrument that measures resilience among nurses; Resiliency Attitudes and Skills Profile measures resilience in at-risk adolescence. Neither of these latter two instruments has been used outside of their initial creation and neither focuses on academic resilience. Therefore, none of the instruments we have found is designed to measure the ability of young adult students to overcome stressors to succeed academically.

Therefore, systematic research on resiliency's effects on academic success *per se* is still somewhat hampered by the many and often loose ways in which resilience is operationalized. To fill this need, we designed and tested an academic resilience inventory (ARI), the items of which were designed to represent various domains of resilience.

Study 1: Instrument Creation

The domains most often found to be relevant to academic success are temperament, social/community relations, family relations, and achievement motivation. From these domains, 67 Lickert-scaled items were created to constitute the pilot version of the ARI. Half of the items were reverse-scored.

The pilot version of the ARI was administered to 315 (196 female) college students. Standard item analyses considerations (Nunnally and Bernstein, 1994) suggest reducing the scale to 40 items. Cronbach's alpha for the 40-item, revised version of the ARI was .89. These 40 items and their relevant statistics are given in Table 1.

Study 2: Predictive Validity

Study 2 assessed the predictive validity of the instrument created during Study 1. The analyses in Study 2 centered on the instrument's ability to predict academic success—measured as cumulative and present college GPA—beyond the extent to which academic success is already predicted by cognitive ability. We also assessed the ARI's divergent validity in relation to apposite personality constructs.

Cognitive ability was operationalized as scores on the Sternberg Triarchic Abilities Test–Modified: Abbreviated Version (STAT-M, Sternberg, 1991). In addition, it is possible that the components of academic resilience that are unrelated to cognitive ability may not be much more than aspects of well-known personality constructs. Operationalized as scores on the Big Five (Goldberg, 1990)—or OCEAN (McCrae and Costa, 1986; 1987; 1996)—personality scores were added to the model as well.

Variously conceived, resilient individuals appear to demonstrate considerable motivation to succeed (Lewis and Looney, 1983; Rutter, 1981; Steinberg, Lamborn, Dornbusch, and Darling, 1993). Therefore, motivation was added to the model as well, operationalized as scores on Dishman, Ickes, and Morgan's (1980) Self-Motivation Inventory (SMI).

Finally, in the instrument creation study, we found a slight tendency for respondents to rate themselves favorably on most items. Therefore, Crowne and Marlowe's (1964) Social Desirability Scale (MCSD) was included to allow the variance accounted for by social desirability to be factored out.

Predictive Validity Results and Discussion

Respondents in Study 2 were a new sample 272 (185 female) college students. A linear regression model with cumulative GPA as the criterion and that contained all terms including the ARI (i.e., the STAT-M, Big Five, SMI, MCSD, and the ARI) was

significant ($F_{11, 111}$ = 2.95, MSE = 0.323, $p < .05$). More importantly, the regression weight for the standardized ARI scores (β = .24) was significant; the R^2 for the model without ARI scores was .20, and R^2 for the model with the ARI scores was .24 ($F_{1,100}$ = 5.64, $p < .05$).

When present GPA (i.e., the GPA for the semester in which data were collected) was the criterion, the ARI parameter (β = .23, $r_{ARI \text{ and present GPA}}$ = .04) was also significant (t_1 = 2.03, $SE \cong 0.00$, $p < .05$), in a model that itself was significant overall ($F_{11, 112}$ = 3.44, MSE = 0.446, $p < .05$). The R^2 for the model which included the ARI term (R^2 = .22) was significantly higher than the R^2 for the comparison model (R^2 = .18) predicting present GPA from all factors except ARI ($F_{1,101}$ = 5.26, $p < .05$). Table 2 displays the results of the linear regressions used to assess whether ARI added to the predictions of cumulative and present GPA.

Adding ARI to models predicting either present or cumulative GPA significantly improved the predictive ability of these models. That which the ARI measures makes a unique contribution to our understanding of what contributes to academic success in college. Therefore, if it is possible to obtain the grades of the participants in, say, a year, an additional, more long-term assessment of the ARI's ability to forecast academic success will be available. If future grades to become available, then one can not only forecast future GPA but also attrition.

Study 3: Construct Validity

Study 3 tests the ability of the ARI to predict academic success when aspects of stressors and/or life barriers are added to the model. To test these models, participants were asked to supply (a) responses to the ARI, (b) responses to a measure of stressful life events (measured as Miller and Rahe's (1997) Recent Life Changes Questionnaire, RLCQ), (c) economic status (self-reported household income divided by number of people in that household), (d) responses to the social desirability measure (MCSD), and (e) self-reported ethnicities.

There are two dominant views about the relationship between resilience and life barriers. Masten (Masten 1994; Masten, Best, and Garmezy, 1990) posited that exposure to barriers instigates some people to become resilient. According to this view, resilience (here, ARI scores) and life barriers should be positively correlated as more exposure to barriers should elicit higher levels of resilience.

Alternatively, others (e.g., Block and Kremen, 1996; Werner, 1984; Werner and Smith, 1992; 1982) view resilience as largely independent of experience. Those who experience inordinately high numbers of barriers, according to this position, simply have more (or at least more patent) occasions in which to demonstrate their innate resilience. Here, resilience levels would remain unchanged as the number of barriers increased or decreased: Resilience and life barriers would not correlate significantly.

Other issues must be addressed before the support for Werner et al.'s hypothesis becomes compelling. First, the stressors investigated here were only those that occurred within the last 12 months. It is plausible that more time is needed for events to alter one's level of resilience. Second, given the influence of economic status on academic success, effort should be made to fashion the ARI so it measures academic resilience as it may relate to poverty. It may be that the ARI-RLCQ relationship—not the lack of ARI-ES relationship—is spurious. Third, the effect of other barriers (e.g., poor relationships with family members, psychological disorders, etc.) and the ARI's relation to them should be assessed so that more general conclusions could be made.

Construct Validity Results and Discussion

We solicited the participation of 115 (78 (68%) female) college students for Study 3. The relation between the ARI and stress and life barriers was analyzed in two linear regression models in which ARI, MCSD (social desirability), ethnicity, and

economic status were regressors. Stressors (RLCQ) were also added to the model predicting present GPA; they were not added to the model predicting cumulative GPA since we only asked for stressors from the past year.

With cumulative GPA as the criterion, the overall model was significant ($F_{6,104}$ = 2.91, R^2 = .15, p < .05). The ARI (β = .17, t_1 = 1.95, SE = 1.33, p < .05) and economic status (β = .21, t_1 = 2.18, SE = 1.50, p < .05) parameters were also significant.

The ARI term was also significant in the model predicting present GPA. The overall model was significant ($F_{8,95}$ = 2.62, R^2 = .19, p < .05). The ARI term (β = .25, t_1 = 2.54, SE = 1.61, p < .05) and the ARI x RLCQ interaction (β = -.20, t_1 = 2.02, SE = 1.28, p < .05) were both significant. The results of these analyses are presented in Table 3. ARI scores also significantly interacted with RLCQ. Figure 1 depicts this interaction. Note that although ARI scores moderated the relation between RLCQ scores and GPA, ARI and RLCQ scores were not significantly correlated. In other words, it appears that the effect of the academic resilience measured by the ARI is to moderate the relationship between stressors and GPA and not so much to influence (or be influenced by) stressors directly. This combination of results (i.e., a significant ARI x RLCQ interaction and a non-significant ARI-RLCQ correlation) lends support to Werner et al.'s hypothesis that stressors appear largely not to affect resilience. In other words, experiencing more stressors does not make one more resilient.

General Discussion

The construct validation analyses suggested that the ARI measures an academic resilience governed by the mechanisms theorized by Werner and her colleagues (e.g., Werner and Smith, 1984): the ARI interacted with the RLCQ in its prediction of GPA, but remained uncorrelated with it. In other words, the academic resilience measured by the ARI appears to affect the influence of life stressors, but may not be affected by them. Of course, this is a conjecture that requires additional support. A longitudinal analysis should clarify the relation between academic resilience and stressors both by allowing one to study the long term effects of stress and by allowing attrition to be used as a criterion.

These results indicate that resilience is a significant contributor to academic success for typical college students, and one that should—and now can—be assessed. Knowledge of students' level of academically resilience can help counselors better advise them and know better how to support them.

We found that ARI-measured resilience is largely unaffected by the number of stressors one experiences. Nonetheless, we need to point out that it is certainly conceivable that beyond the range of stressors we could measure, with differently-aged students, or with more dire outcomes than GPA that resilience is indeed affected by the stressors one encounters. Therefore, the ARI can help guide counselors advise students navigate the normal range of stressors one encounters in college; its ability to measure one's success handling more serious and chronic challenges is far from established.

The extent to which academic success can serve as a microcosm for general success, and that scores on the ARI can serve as measures of general resilience would suggest that resilience has a small, but significant impact on one's success. However, we would argue that academic success underestimates the success a resilient person may achieve in other areas for a couple of reasons. First, academic success is a very narrow sort of success (even though it does correlate and allow for other types of success). One characteristic of a resilient person appears to be that he or she can find novel ways of working around a problem (Werner and Smith, 1982); they may even find other ways of becoming successful. A truly resilient person may fail academically only to go on and find another avenue to success. Second, the ARI was designed to be independent of intelligence—even creative and practical intelligences. Academics do require tenacity, but they also certainly require intelligence (as reflected here in the strong weight of SAT and STAT-M scores). It may be that resilience or motivation themselves aren't enough to succeed academically, one must also be sufficiently intelligent. Again, this is not as true for success outside of academia. Although intelligence does predict life success (e.g., Long and Vaillant, 1984), the role of intelligence is not as strong as it is in academia, and therefore traits like resilience may be able to guide people's successes and failures in other areas of one's life.

Future Directions

Whether or not resilience and academic resilience are related, and whether or not they can be sufficiently explained by other, already-well-studied constructs must remain only conjecture until resilience can be better defined and measured—until instruments like the ARI—or other means of measuring resilience objectively and predictively—are perfected, the study of resilience and its mechanisms and components relies on ordinal data and case studies and their subjective interpretation.

The ARI's predictive and construct validities were both sufficient to justify additional development of the ARI and addition studies using it to assess resilience. Therefore, we believe that the ARI laid enough of a foundation in the current studies to allow subsequent research to further define and refine the quantitative study of resilience. Expanding the theoretical domain of the ARI may allow it to measure better the relation to poverty. In addition, the domain from which items are sampled could be expanded to include other barriers, such as psychological disorders and family discord. At the same time, the impact of additional barriers should be investigated, both to assess the extent of their influence on academic success and to study any moderating effect of the ARI on them.

Clarifying the domain may increase the reliability as well as increase its predictive validity. In addition, the same steps which should improve the validity of the ARI should also increase its reliability. The more restricted range of the sample in the second study reduced the ARI's Cronbach's alpha compared to that of the first study, but refining the focus of the ARI should improve Cronbach's alpha, and consequently increase the maximum value for the scale's validities (i.e., correlations with criteria).

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Table 1

Descriptive Statistics of the ARI Items on the final, 40-item version. Item number is the number on the original version. Items are sorted in order of presentation in final version.

Original Item Number and Content	Mean	S.D.	r_{it}
63 I have been successful in most areas of my life.	2.21	0.96	0.62
41 I look at problems as challenges to be overcome, not things to avoid.	2.55	1.09	0.55
64 I have always been motivated to do well in school.	2.35	0.88	0.55
10 There's a lesson to be learned from every situation.	1.92	1.01	0.54
11 Most of the problems in my life are too big to be solved.	2.03	0.96	0.54
27 There is no one in my life who takes good care of me.	2.06	1.17	0.54
46 I can adapt easily to new situations.	2.29	0.86	0.54
39 I have high expectations for myself.	1.99	1.15	0.53
42 I don't like myself.	1.95	0.99	0.53
67 Things usually work out for me in the end.	2.13	0.46	0.53
22 If I really want to do something, I can do it.	1.73	0.77	0.51
65 I set high goals for myself that I plan to reach.	2.35	0.78	0.5
26 I can easily find people to help me when I need it.	2.29	1.04	0.49
9 When I need help, there never seems to be anyone around.	3.65	1.08	-0.48
15 I usually learn from my mistakes.	2.23	0.99	0.48
35 I often don't think that I deserve to succeed.	2.31	1.19	0.46
50 Things are never as bad as they seem.	2.35	0.96	0.46
24 I would make a good parent.	1.82	0.94	0.45
32 There is no situation I could not overcome.	2.33	1.01	0.45
62 I can overcome any obstacle.	3.73	1.03	-0.44
34 I can usually take care of myself.	2.07	0.95	0.44
6 I have at least one very close friend.	1.58	0.92	0.44
21 I don't like taking on new responsibilities.	2.67	1.16	0.43
12 I don't like trying new things.	2.09	0.99	0.42

45	Everything works out all right in the end.	2.02	0.8	0.42
3	I get excited when new opportunities arise.	1.8	0.76	0.41
36	Even though stuff can go wrong, things usually work out in the end.	1.92	0.82	0.41
54	I am respected and admired at work.	2.64	1	0.41
58	I gain comfort from my religious faith.	2.69	1.32	0.41
13	I usually look at the bright side of things.	2.27	0.93	0.4
66	I am a survivor.	1.96	0.56	0.4
1	I like learning new things.	1.49	0.68	0.38
16	If my parents can't help me, I have no other adults I can turn to for help.	2.23	1.09	0.38
5	I can make people laugh.	1.74	0.72	0.37
18	Other people tend to rely on me to get things done.	2.34	0.98	0.37
33	When I'm in trouble, there is always someone I can turn to for help.	1.94	0.9	0.37
40	I'm not the parental type.	2.22	1.16	0.37
23	I like solving problems.	2.05	0.94	0.36
49	I find it hard to make new friends.	2.66	1.18	0.35
59	I am a pessimist.	3.22	1.13	-0.34

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Table 2

Summary of Results from Linear Regressions Assessing the ARI's Predictive Validity. The F-score, k, and N are for the test if the R^2 for model containing an ARI term was significantly larger than the R^2 for the model without an ARI term, where k is the number of parameters in the model and N is the number of observations. The difference between k of the model containing the ARI term and the k of the paired model without the ARI term yields the numerator df for the F-score. The N for the model containing the ARI minus the k for the same model minus 1 yields the denominator df for the F-score.

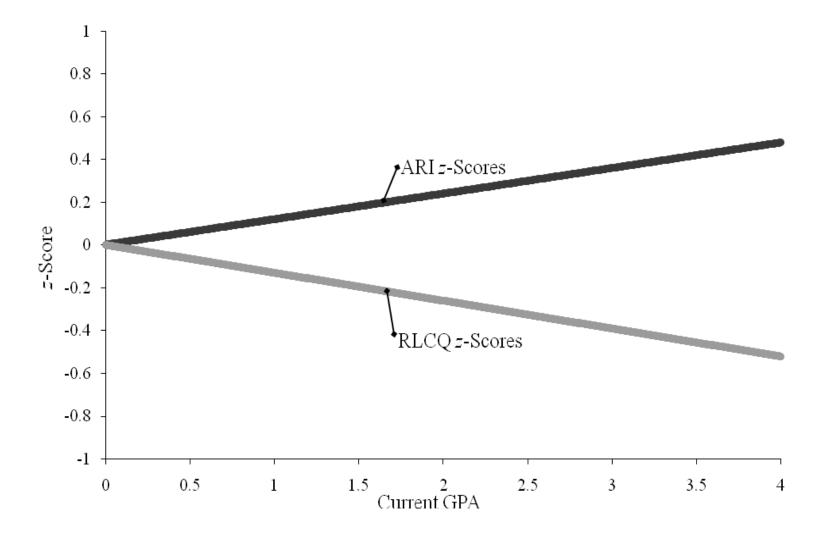| Criterion | Model | | | | STAT-M | | | Big Five β Weights | | | | | | | |
	R^2	F	k	N	Anal.	Pract.	Creat.	Extr.	Agree.	Neur.	Cons.	Open.	SMI	MCSD	ARI
Cum. GPA	.24	5.64	11	112	.28	.11	-.08	.05	.34	-.02	-.05	-.16	-.06	-.03	.24
	.20	-	10	114	.30	.14	-.03	.15	.30	-.01	-.06	-.12	.12	.04	-
Present GPA	.22	5.26	11	113	.21	.07	-.03	.06	.33	.01	-.09	-.16	-.10	-.03	.23
	.18	-	10	115	.23	.10	.01	.15	.29	.02	-.10	-.12	.07	.04	-

Table 3

Summary of Results from Linear Regressions with ARI Scores, RLCQ Scores, Economic Standing, Ethnicity, and MCSD Scores as Predictors. The F-score, df_1, df_2, and R^2 are linear regression model predicting the given criterion. The F-score numerator and denominator dfs are df_1, and df_2, respectively. "ARI x RLCQ" is the ARI by RLCQ interaction term. "ES" is economic status, and "ARI x ES" is the ARI by ES interaction term. The ethnicity categories are those designated by the UTA IRP Office.

| | | | | | | | ARI x | | ARI | β Weights — Ethnicity | | | | |
Criterion	Model R^2	F	df_1	df_2	ARI	RLCQ	RLCQ	ES	x ES	Asian	Black	Hispanic	White	MCSD
Present GPA	.19	2.62	8	95	.25	-.19	-.20	.18	.00	-.08	-.17	-.16	.00	-.03
Cum. GPA	.15	2.91	6	104	.17	-	-	.21	-.09	-.11	-.18	-.13	.00	.00

Figure 1

Comparison of ARI and RLCQ (Stressors) Regression Lines as Functions of the Current GPA.