

DEVELOPMENT OF A NON-INTELLECTIVE MEASURE OF ACADEMIC
SUCCESS: TOWARDS THE QUANTIFICATION OF RESILIENCE

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DEVELOPMENT OF A NON-INTELLECTIVE MEASURE OF ACADEMIC
SUCCESS: TOWARDS THE QUANTIFICATION OF RESILIENCE

by

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DEDICATION

To my family

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"Some people dream of accomplishing great deeds; others stay awake late to do them."

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ABSTRACT

DEVELOPMENT OF A NON-INTELLECTIVE MEASURE OF ACADEMIC SUCCESS: TOWARDS THE QUANTIFICATION OF RESILIENCE

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Resilience, generally defined as being inordinately unaffected by stress and/or barriers, may prove to be an important ingredient in academic success. Currently, resilience is defined in various, general terms. Two studies attempted to lay the foundation for a more concrete operationalization of academic resilience. In Study 1, the Academic Resilience Inventory (ARI), a paper-and-pencil, self-report instrument, was created and found to be reliable. In addition, some support was found for the instrument's predictive validity. Study 2 explored the instrument's predictive and construct validities in more detail. The ARI was found to contribute unique information to the prediction of academic success, primarily measured as cumulative GPA. The contribution was small, however, and areas in which the ARI could be refined or

strengthened were detected. The ARI was construct valid in that it moderated the relationship between some barriers and academic success, but other theoretically important types of barriers were unrelated to the ARI. The ARI successfully fulfilled its intended functions, but requires additional development, in order to increase both convergent and divergent aspects of its construct validity, and to expand the domain from which items are sampled.

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CHAPTER 1

INTRODUCTION

Spitz and Wolf (1946) assessed the mental health of 123 institutionalized, motherless, human infants. The researchers reported that 32 of these infants developed either moderate or severe “anaclitic” depression. Two of these infants died, even though the attending staff met all of their apparent biological needs. Spitz and Wolf suggested that infants require more than just biological nurturing to survive; they also need psychological nurturing. Spitz and Wolf’s interpretation was significant, especially given the *Zeitgeist*--their work preceded the publication of Harlow’s (1953) studies of maternal deprivation on baby Rhesus monkeys by seven years. Nonetheless, there is more in their data than highlighting the importance of “psychological,” in addition to “biological,” needs: while 32 of their subjects were diagnosed with depression, the remaining 79 received no such unfortunate diagnoses.

Mary Ainsworth (1962) addressed the pronounced variability she found in the effects of poor parenting among the African children she studied. Unfortunately, however, she felt that this variability was largely inexplicable (and thus uninteresting), so she did not attempt to investigate it further. Perhaps Spitz and Wolf (1946) also did not venture an interpretation of the individual differences between their subjects because, at the time, no defensible interpretation seemed apparent.

Child development researchers often have assumed that the variability in the effect of deleterious, environmental factors on children can be sufficiently explained by variability in the intensity of the deleterious factor (Rutter and Quinton, 1984). In other words, Rutter and Quinton argued that researchers often believed that children's sensitivity to deleterious factors can be assumed to be constant; if a child was unaffected by these deleterious factors, it was because that child did not receive a large enough exposure to the deleterious factor for it to affect the child. Researchers did not consider that protective factors (either internal or external) may be mediating the effects of the deleterious factors.

Indeed, there may not be a coherent explanation for the variability in the children's success in the face of environmental rigors; ascribing it to random error may suffice. However, the discoveries in another area of research suggest that at least some of this variability can be accounted for systematically. The child psychiatrist Michael Rutter (1972; 1978; 1979; 1980) observed—and then studied—similarities among children who adapted successfully to severe disadvantages, such as maternal deprivation. With his research, scientific investigation into individual differences in children's reactions to calamitous events had begun.

Garmezy (1974) was first to call these children “resilient” to provide a summary for their ability to appear minimally affected by events that hamper various aspects of the development of many of their peers. Initially, the field of resilience research was dominated by those who conducted risk research (e.g., Anthony, 1974; Garmezy, 1974; Murphy and Moriarty, 1976), but the number of scientists studying resilience—and the

number of methods they employed—grew. To date, researchers have studied resilience in such populations as the children of psychiatric patients (Anthony, 1974; 1987; Garmezy, 1981; 1983; Kellam, Branch, Agrawal, and Ensminger, 1975; Masten, 1987; Watt, Anthony, Wynne, and Rolf, 1984; Worland, Weeks, and James, 1987), minority children in chronic poverty (Clark, 1983; Comer, 1980; 1985; Gandara, 1982; Garmezy, 1981; 1983; Shipman, 1976; Werner, Bierman, and French, 1971; Werner and Smith, 1977, 1982, 1992), pre-school children (Tschann, Kaiser, Chesney, Alkon, and Boyce, 1996), children with chronic illnesses such as diabetes (Hauser, Vieyra, Jacobson, and Werlteib, 1985; 1989; Schwartz, Jacobson, Hauser, and Dornbush, 1989), long-term AIDS survivors (Robkin, Remien, Katoff, and Williams, 1993), and war survivors (Bettelheim, 1986; Fraser, 1974; Moskovitz, 1983; Rosenblatt, 1983).

For example, in a seminal line of investigation, Werner and her colleagues (Werner, Bierman, and French, 1971; Werner and Smith, 1977, 1982, 1992) followed a cohort of about 500 children for over 30 years. These children were all born into impoverished and disadvantaged homes in 1955 on Kaua'i, the northern most of the main Hawaiian islands. Among its many findings, this longitudinal study yielded evidence that perinatal stress, poverty, family dysfunction, and low maternal education could all be used to predict mental health problems in later life.

Werner et al. (Werner, Bierman, and French, 1971; Werner and Smith, 1977, 1982, 1992) found that exposure to even one of these factors put a child at greater risk of mental health problems. Worse still, the influence of the factors appeared to combine in a roughly multiplicative function. Yet, despite the strongly deleterious,

multiplicative effects of these risk factors, about one-third of the children exposed to these factors appeared largely to have overcome the disadvantages at each stage of their development. In infancy, these resilient children were physically healthier. As toddlers, they appeared to be better able to engage adults and elicit nurturing behaviors from their parents as well as from other adults. In adolescence, they had better academic success, including better reasoning ability and reading skills. Overall, they were more socially competent and psychologically healthier than the two-thirds majority of their peers. Included in their psychological healthiness were higher feelings of self-esteem and a more internalized locus of control. It is possible that this high self-esteem and internal locus of control may be also construed as an optimistic explanatory style. In adulthood (i.e., up to 31 and 32 years old), these individuals had had no trouble with the law (unlike many of the two-thirds majority of their peers), and they had succeeded more in academic and vocational settings.

As adults, there was some indication that the resilient one-third of Werner et al.'s (Werner, Bierman, and French, 1971; Werner and Smith, 1977, 1982, 1992) Kaua'i subjects did not emerge completely unaffected by their childhood stressors. They had more stress-related health problems than similarly competent peers who had not had exposure to the above-mentioned stressors in childhood. Nonetheless, this resilient group outperformed their similarly disadvantaged peers in nearly every realm of life in adulthood, just as they had done during childhood.

Researchers in this area tend to agree that, for some reasons, these resilient people appear to be able to endure rigors that overwhelm most of their peers. 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., 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. 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).

In addition, to date and to the best of my knowledge, only Block and Block (1980) did not dichotomize their subjects into either “resilient” or “non-resilient” groups. (Block and Block conceptualized resilience as one’s ability to adapt to new situations and challenges.) Surely, individuals vary as to their degree--and maybe even type--of resilience. It is likely that “non-resilient” and “resilient” individuals vary in their absolute amount of resilience. The subjective assessments used to date are not able to make fine enough distinctions to move beyond dichotomous classification.

These limitations do not imply that the field has been nothing but fruitless chaos. Resilience research has yielded important advances in understanding and policy improvements. It stimulated developmental psychologists to investigate beneficial as well as detrimental influences on development. It 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; Wang, Reynolds, and Walberg, 1988), individual efforts to improve children’s quality of life (Vachss, 1995), and more efficient improvement of inner-city schools (Anderson, 1994). 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.

Nonetheless, the study of resilience appears to suffer from problems experienced by many burgeoning areas of study. Diverging definitions, purely descriptive “case” studies, and a lack of quantification are often found in new areas (Ray, 2000). Although these initial, “loose” approaches probably help their respective fields in their pioneering investigations, the lack of standardization and objectivity may eventually hinder progress (Gordon and Wang, 1994).

In brief, among the current problems faced by resilience research are those that many fields of study encounter when they first begin to evolve from pioneering exploration to systematic understanding. The disparate views of resilience should benefit from the establishment of a standard definition and measurement of the resilience construct (Bartelt, 1994). The current paper is a preliminary attempt to develop a paper-and-pencil instrument that can be used to assess the degree of resilience in college students.

1.1 Initial Scale Creation

1.1.1 Domains of Content for Resilience

The items for the initial scale were drawn from the domain of characteristics posited to be indicative of resilience. Even though no consensus has been established to define resilience, most of the researchers in this area do outline the factors they have

found to characterize resilience. The following are the major factors argued to characterize resilient individuals.

1.1.1.1 Intelligence

While the scale created in the current paper seeks to remove the effect of intelligence, intelligence has been found to be a characteristic of resilient children (Masten, Hubbard, Gest, Tellegen, Garmezy, and Ramirez, 1999; Radke-Yarrow and Sherman, 1990). In fact, IQ and visual-motor coordination have both predicted well good mental health (as measured by peers, parents, psychologists, and teachers) in children of parents with severe mental illness (Anthony, 1987; Worland, Weeks, and Janes, 1987). Garmezy (1985) argued that resilient children tended to possess good intellectual functioning, and Garmezy and Masten (1991) found that intelligence protected against conduct problems and aggression. Long and Vaillant (1984) reported that IQ predicted an increase in SES over one's lifetime among participants with low to average IQs.

1.1.1.2 Temperament

Garmezy (1993) listed a positive temperament, including a high activity level and a positive responsiveness to others, as an important factor protecting children from risk. Werner (1989) also remarked that his resilient subjects had a more positive disposition than his less resilient subjects. Similarly, an optimistic attitude (Masten and Coatsworth, 1995), equanimity (Wagnild and Young, 1993), and feelings of self-worth (Masten, 1994) have been posited as characteristics of resilient children.

1.1.1.3 Social Relations

A factor that may overlap with temperament, social involvement (with friends and/or the community) has been identified as another protective factor (Garmezy, 1975; Lewis and Looney, 1983a; 1983b; Masten, Best, and Garmezy, 1990; Steinberg, Lamborn, Dornbusch, and Darling, 1993). Conversely, an antisocial posture may undermine academic achievement (Masten, Coatsworth, Neemann, Gest, Tellegen, and Garmezy, 1995). Resilient individuals also may be socially warmer and more extraverted (Masten and Coatsworth, 1995). Masten and her colleagues stress that resilient children are particularly able to elicit help from others, especially supportive adults (Masten, Morison, Pellegrini, and Tellegen, 1990; Masten, 1989; 1994a; 1994b; Masten, Best, and Garmezy, 1990; Masten and Coatsworth, 1995; Masten, Garmezy, Tellegen, and Pellegrini, 1988; Masten, Hubbard, Gest, Tellegen, Garmezy, and Ramirez, 1999).

1.1.1.4 Family

Many investigators have found that a quality family life is a major aspect of resilience. The quality of the relationship with the primary care-giver appears especially important (Fisher, Kokes, Cole, Perkins, and Wynne, 1987; Johnson, Glassman, Fiks, and Rosen, 1990; Lee, 1984; Masten, Morison, Pellegrini, and Tellegen, 1990; Masten, 1989; 1994a; 1994b; Masten, Best, and Garmezy, 1990; Masten and Coatsworth, 1995; Masten, Garmezy, Tellegen, and Pellegrini, 1988; Masten, Hubbard, Gest, Tellegen, Garmezy, and Ramirez, 1999; Radke-Yarrow and Sherman, 1990; Sameroff, Barocas, and Seifer, 1984; Kim and Dembo, 2000).

Steinberg, Lamborn, Dornbusch, and Darling (1993) review several lines of evidence suggesting that parenting style and level of involvement affect the academic success of their children. Clark (1983) and Gandara (1982) also argue that parenting practices affect childhood academic achievement. They noted that a role model can be of great benefit to children. For example, Clark found that girls were greatly affected by the presence of a gainfully employed adult woman in their life to serve as a positive role model. Finally, Werner (1984) argued that resilient children are especially adept at eliciting nurturing behaviors from adults, be those adults parents, associates (including teachers), or even strangers. In fact, Werner suggested that a prime indicator of success for disadvantaged children was their ability to establish a close, positive relationship with a nurturing adult--preferably one of their parents, but, if not, some other adult.

Resilient children and adolescents, especially those growing up in impoverished inner cities (Clark, 1983; Gandara, 1982; Garmezy, 1991), tend to have parents who are warm and who have high expectations for achievement and responsibility (Baldwin, Baldwin, and Cole 1990). Children with close family ties do well (Garmezy, 1991), but children in large families tend to do poorly (Furstenberg, Brooks-Gunn, and Morgan, 1987). Resilient children have also been found to have parents who are educated (Furstenberg, Brooks-Gunn, and Morgan, 1987) and who get along well with each other (Lewis and Looney, 1983a; 1983b). During adulthood, a supportive and stable spouse has been found to help individuals who were raised in institutions avoid criminality, obtain more education, and evince good mental health (Rutter and Quinton, 1984).

1.1.1.5 Achievement Motivation

Not surprisingly, achievement oriented individuals appear to be proficient at overcoming disadvantageous situations (Cowen, Wyman, and Work, 1990; Lee, 1984; Lewis and Looney, 1983a; 1983b; Rutter, 1981; Steinberg, Lamborn, Dornbusch, and Darling, 1993). Spencer, Cole, DuPree, Glymph, and Pierre (1993) argued that self-efficacy (i.e., general feelings of competence) is a component of resilience. Similarly, Beardslee (1989) conjectured that resilience involves the ability to exert control over one's environment. Wagnild and Young (1990) posited that self-reliance and perseverance, among other factors, were characteristics of resilience. Byers (1962) found that realistic yet ambitious goals were related to high school students' academic success.

1.1.1.6 Academics

Resilient children tend to do well in school (Lewis and Looney, 1983a; 1983b; Rutter, 1990; Rutter and Quinton, 1984; Wang, Haertel, and Walberg, 1994). In fact, some researchers have actually used academic success (and IQ and achievement test scores) to operationalize resilience (Baldwin, Baldwin, and Cole 1990). Academic success may result from resilience, but it also harkens future life success. Educational aspirations, mediated by academic success, have predicted better lives for both in the teen-aged mothers and their children (Furstenberg, Brooks-Gunn, and Morgan, 1987). In addition, education can result in people having fewer children (Furstenberg, Brooks-Gunn, and Morgan, 1987), an important consideration in that members of smaller

families tend to have more material and psychological resources (Furstenberg, Brooks-Gunn, and Morgan, 1987).

1.1.1.7 Additional Factors

In addition to these general categories of characteristics are various, miscellaneous factors that might also be significant. Several researchers have proposed that resilient individuals have strong religious faith (Masten, 1994) and self-confidence (Radke-Yarrow and Sherman, 1990). Hopefulness (Robkin, Remien, Katoff, and Williams, 1993) and even a good sense of humor (Masten and Coatsworth, 1995) have also been proffered as characteristics of resilient individuals. High socio-economic status is apparently a strong protective factor (Garmezy, 1987; Masten, 1994; Shipman, 1976), but there is some evidence that individuals raised in poverty simply may require different skills or characteristics to overcome obstacles than those living in middle-class neighborhoods (Baldwin, Baldwin, and Cole 1990; Garmezy, 1991). Schools that promote social competence, academic excellence, appreciation of good work, and a prosocial atmosphere can also help protect students from risk factors (Anderson, 1994; Garmezy, 1991; Steinberg, Lamborn, Dornbusch, and Darling, 1993).

1.1.2 Academic Success

Because concept of resilience assumes persistent competence in the face of adversity (e.g., Masten and Coatsworth, 1995; 1998), it is necessary to operationalize competence. An important domain in which young people, especially college students, can display competence is in academics. Academic success—especially in higher education—is itself a measure of past success, because it denotes obtaining a high school

diploma (or equivalency degree) and applying successfully to a college. Academic success is also a measure of competence given the time and energy needed to succeed academically. In addition, school success is increasingly an important step toward achieving vocational success. As noted briefly above, academic success also appears to be a reliable indicator of competence in other areas of life. Masten, Morison, Pellegrini, and Tellegen (1990) found, for example, that academic success was related to better life functioning in such areas as self-control and engagement with peers. Rutter and Quinton (1984) reported that a positive school experience (marked by such things as high grades and positive assessments of personal academic and extra-curricular experiences at school) was a strong predictor of the lack of psychiatric problems, criminality, and marital discord later in life.

On the other hand, it should also be noted that labeling unexpectedly high academic success as “resilient” may merely be substituting a slightly more modern term for “overachievement.” Carmical (1964) defined high school achievers and underachievers simply as those with high and low grades, respectively (i.e., she did not investigate what grades the students would be expected to get based on some non-academic criterion, such as family discord). After administering a rather extensive battery of instruments to her subjects, Carmical concluded that the two groups varied little in their intellect, and thus that the majority of both groups (90% of the achievers and 70% of the underachievers) could potentially succeed in college. Both groups differed little in most of the measures. The few differences there were suggested that the achievers tended to be more emotionally stable and intellectually reflective.

Achievers also had higher self-esteem and were somewhat more socially integrated. Nonetheless, Carmical concluded that the critical difference between these two groups was likely left unmeasured by her study. She recommended further investigations into familial, social, and—most importantly—self-efficacy factors. Indeed, with regard to such factors, Sears (1940) found that overachievers were more self-confident. Sears also found that overachievers set more realistic goals for themselves, a finding later replicated by Byers (1962). Though not studying over- or underachievers *per se*, Durojaye (1974) also found that students' aspirations influenced their academic success.

Interestingly, McQuary (1954) found that the overachievers in his study tended to come from less privileged backgrounds than the underachievers. Based on his study, it appears that research into over- and underachievement could have led directly into resilience research, but this did not happen. The reason for this outcome might be that other researchers besides McQuary tended to find that impoverished backgrounds did not facilitate academic achievement. For example, soon after McQuary published his findings, Fliegler (1957) reported evidence supporting his contention that gifted children who underachieved did so primarily because inadequate family and/or social relationships lead to the deterioration of their interpersonal skills, leading to maladjustment and underachievement. It wasn't until Rutter (1972) started his investigations into the “protective” factors influencing the children of parents with mental illness that these issues would be systematically re-addressed. Like research into motivation, research into over- and underachieving has become largely assimilated into other areas. Studies of the actual success of gifted children (i.e., those with IQs of

130 or greater) appear to account for most of the studies of over- and underachieving individuals (Peterson, 2000).

1.2 Scale Creation

1.2.1 Previous Attempts

1.2.1.1 Initial Scales

The scale created in the present investigation is not the first one that has been used to predict academic success from non-intellective factors. The first attempts to validate such measures began in the mid-1950s (Sander, 1953). These earliest measures were used to predict performance in various military training schools, such as the U. S. Naval Officer Candidate School (Suci and Vallance, 1954), the U. S. navy's Nuclear Power School (Kipnis and Glickman, 1961), and the training of U. S. navy radiomen (Kipnis and Glickman, 1959). After the construction of these first few scales, there appears to have been a lull in the creation of scales attempting to measure the contribution of non-intellective factors to academic performance; instead of attempting to develop such scales, researchers investigated the contribution of non-cognitive factors directly.

1.2.1.2 The Multidimensional Assessment of Gains in School

In the early 1970s, Guertin and his associates (Guertin and Graves, 1972; Guertin and Moffett, 1973; Kuenz and Guertin, 1974) published and tested a non-cognitive test, the Multidimensional Assessment of Gains in School, High School Level (MAGS). The 400 items for the scale were gathered from interviews with parents, high school faculty, and students. The items were chosen to represent the various interests

and activities of high students. The items were weighted based on a combination of the decisions of the researchers and by data-driven factor analysis. After the MAGS was then administered to a second group of high school students, the items were grouped into factors based on these responses (the details of this factor analysis were not given).

Guertin and his colleagues tested the predictive validity of the MAGS in two studies (Guertin and Moffett, 1973; Kuenz and Guertin, 1974). In these studies, the MAGS was not a consistently significant predictor of academic success or scholastic aptitude scores. In other words, the predictive validity of the MAGS was found to be unstable.

Despite Kuenz and Guertin's (1974) rigorous and objective investigations, several possible factors (e.g., high participant attrition, data-driven item and factor selection, etc.) were present that might have weakened the predictive ability of the MAGS. Unfortunately, our hindsight does not allow us to determine if it was the MAGS itself or if it was other, external factors that compromised the MAGS. Therefore, although the MAGS has historical interest, the uncertainty over the predictive validity of its items undermines its use as a reference for the creation of another non-intellective scale.

The items on the MAGS were based on the interests and behaviors of high school students a generation before the creation of the current scale for college students. Because the items were derived with minimal theoretical guidance, an items' applicability rests on little more than any similarity between their samples and ours.

1.2.1.3 The Non-Cognitive Questionnaire

Cogently arguing that standardized tests scores are less valid for African-American college applicants than for White applicants, Tracey and Sedlacek (1984) developed the Non-Cognitive Questionnaire (NCQ). The purpose of this measure was to predict academic success with equal validity for all applicants, thus establishing a level playing field for minority applicants. Based on the assertions of Sedlacek and Brooks (1976), Tracey and Sedlacek designed the items to assess self-concept, realism of self-appraisal, understanding and ability to deal with racism, preference for long-over short-term goals, availability of a support, successful leadership experience, community service, and persistence. The NCQ consisted of 2 nominal items about the participant's educational expectations, 18 Likert scale items, and 3 open-ended items about present goals, past accomplishments of which the participant was proud, and extracurricular activities and offices held.

O'Callaghan and Bryant (1990) later administered the NCQ to determine whether African-American and White participants answered the items similarly. Their informal analysis of differential item functioning revealed that African-American students scored higher than White students on items measuring positive self-concept and ability to deal with racism. Tracey and Sedlacek (1984) did not report the Cronbach's alpha for the NCQ. They found that fourteen of the items significantly correlated with grade point average (GPA) at least one of the three times they tested for such correlations. Tracey and Sedlacek (1985) confirmed that the items on this scale

significantly predicted college GPA up to four years later, especially when used in conjunction with Scholastic Aptitude Test (SAT) scores.

In an article published in 1989, Tracey and Sedlacek revised the NCQ--expanding the number of items to 67--to improve the scale's poor, but previously unreported, low internal reliability. The new scale was called the Non-Cognitive Questionnaire-Revised (NCQ-R). Tracey and Sedlacek reported that the validity of the NCQ-R remained relatively intact, results that were further confirmed by Sedlacek and Adams-Gaston (1992). Unfortunately, Arbona and Novy (1990) found that the NCQ-R did not predict college grades for African-American students. Ironically, Arbona and Novy found that the NCQ-R was best able to predict White's continued enrollment in college. Hood (1992) and Young and Sowa (1992) also found that the NCQ-R lacked the ability to reliably predict college GPAs. No further uses of the NCQ-R can be found after 1992.

The NCQ-R was designed to predict the academic success of minority college students. Because the scale also attempted to make this prediction using non-intellective factors, the item selection process for the NCQ-R would potentially aid our item selection. Of course, the limited predictiveness of the NCQ-R suggests that one should not rely exclusively on items from its domain. Nonetheless, Tracey and Sedlacek's (1984) measure might provide guidance for item selection, especially to the extent that their decisions correspond with those arrived at through examining the research on resilience. The items of the revised NCQ-R (which subsumes the items of the NCQ) are presented in Appendix A.

Again, Tracey and Sedlacek (1984; 1989) created items that were designed to measure preference for long- over short-term goals, availability of support, persistence, self-concept, realism of self-appraisal, understanding and ability to deal with racism, successful leadership experience, and community service. Research on resilience (e.g., Cowen, Wyman, and Work, 1990; Garmezy, 1975; Masten, Hubbard, Gest, Tellegen, Garmezy, and Ramirez, 1999; Radke-Yarrow and Sherman, 1990; Spencer, Cole, DuPree, Glymph, and Pierre, 1993) suggests that the former three of these categories should be especially useful. In addition, Tracey and Sedlacek included items concerning family and social relationships that might be useful in this regard (e.g., Garmezy, 1975; Masten, Best, and Garmezy, 1990).

Wagnild and Young (1993) were the only researchers to publish a scale specifically designed to measure resilience, specifically, nurses' vocational resilience. This scale emphasized equanimity, perseverance, self-reliance, the meaningfulness of one's life and "existential aloneness." Wagnild and Young's research revealed that this scale had good reliability and was modestly but significantly correlated with job morale and self-reported life satisfaction. The extent to which these areas overlapped with the predominant views of the composition of resilience--viz., the inclusion of equanimity, perseverance, and self-reliance--made this scale another candidate to guide item selection. The major problem, however, was that the items were focused on nurses' vocational situations and had little applicability to college students.

1.2.2 Creation of the ARI

Items for the instrument created here, the Academic Resilience Inventory (ARI), were created and chosen based on the extent to which they appeared to measure traits characteristic of resilience. A list of concepts that various authors posited as characteristics of resilience was created. This list is presented in Appendix B, generally ordered from the most commonly mentioned characteristics (which were mentioned by nearly every author) to a few characteristics that seem promising but were rarely mentioned.

The list of concepts provided in Appendix B were used to generate the 67 statements that comprised the original version of the ARI. The order of the items was randomized to create the instrument presented in Table 1.1. As the instructions in Table 1.1 indicate, participants were asked to choose whether they strongly agreed, agreed, neither agreed nor disagreed, disagreed, or strongly disagreed with each statement. Items with a plus sign before them in Table 1.1 were scored such that a response of *Strongly agree* was given a score of 5 and *Strongly disagree* a score of 1. Items with a negative sign before them in Table 1.1 were reversed scored (i.e., *Strongly agree* was scored as 1). The numerical scores for all of the items were then summed to obtain the overall score on the scale. Higher scores indicated greater agreement with putatively resilient characteristics.

It is important to note that no effort was made to conceal the intended content of the items. In other words, the items are transparent, and presumably face valid with regard to their content. Because of this, the instrument may potentially be useful as a

measure of academic resilience, but it should not be used to screen people because anyone wishing to fake a certain score on the instrument would probably be able to. It should also be noted that the ARI was designed to measure academic resilience, and the resilience investigated in this thesis is therefore limited to academic resilience.

The initial version of the scale was made intentionally long to provide a pool of items from which the best items could be drawn. There was no target number of items sought for the revised version, but we hoped to find a smaller group of reliable items that displays good predictive validity so that the scale could be administered easily to many populations and in applied settings such as academic advising offices at colleges and universities.

Table 1.1. The Academic Resilience Instrument as Administered in Study 1. The parenthetical signs were not included in the version administered to the participants; these signs indicate whether the item was scored in the positive or negative direction.

***Instructions:* Please record all of your answers on the blue answer sheet provided. Do not fill in your age. Please fill in your birthday in the lower, left corner of the answer sheet. Please read each of the numbered sentences below then indicate how much you agree or disagree with the given statement by filling in one response for each question on your answer sheet based on the following scale:**

- a.) Strongly agree
- b.) Agree
- c.) Neither agree nor disagree
- d.) Disagree
- e.) Strongly disagree

Thank you for your cooperation!

- (+) 1. I like learning new things.
- (+) 2. If I'm in trouble, someone usually helps me out.
- (+) 3. I get excited when new opportunities arise.
- (+) 4. If I am feeling very bad, there is somewhere I can go to get away for a while.
- (+) 5. I can make people laugh.
- (+) 6. I have at least one very close friend.

Table 1.1. -- *Continued*

- (+) 7. If I have a problem, I usually let it take care of itself.
- (-) 8. I don't like to go to school.
- (-) 9. When I need help, there never seems to be anyone around.
- (+) 10. There's a lesson to be learned from every situation.
- (-) 11. Most of the problems in my life are too big to be solved.
- (-) 12. I don't like trying new things.
- (+) 13. I usually look at the bright side of things.
- (+) 14. If I have a secret, there is someone I can tell who I know won't tell anyone.
- (+) 15. I usually learn from my mistakes.
- (-) 16. If my parents can't help me, I have no other adults I can turn to for help.
- (-) 17. I don't have strong faith in my religion.
- (+) 18. Other people tend to rely on me to get things done.
- (+) 19. The more things change, the more they remain the same.
- (-) 20. I don't have many friends.
- (-) 21. I don't like taking on new responsibilities.
- (+) 22. If I really want to do something, I can do it.
- (+) 23. I like solving problems.
- (+) 24. I would make a good parent.
- (+) 25. I seek out older people to gain wisdom from their experiences.
- (+) 26. I can easily find people to help me when I need it.
- (-) 27. There is no one in my life who takes good care of me.

Table 1.1. -- *Continued*

- (-) 28. If bad things happen to me, it can really bring me down.
- (+) 29. I prefer it when things are stable and unchanging.
- (+) 30. I am always busy doing things.
- (+) 31. If I have a problem, I'd rather handle it on my own.
- (+) 32. There is no situation I could not overcome.
- (+) 33. When I'm in trouble, there is always someone I can turn to for help.
- (+) 34. I can usually take care of myself.
- (-) 35. I often don't think that I deserve to succeed.
- (+) 36. Even though stuff can go wrong, things usually work out in the end.
- (+) 37. I have a role model (someone I look up to and admire).
- (+) 38. I don't mind when things in my life change (like moving somewhere to a new neighborhood, or going to a new grade level).
- (+) 39. I have high expectations for myself.
- (-) 40. I'm not the parental type.
- (+) 41. I look at problems as challenges to be overcome, not things to avoid.
- (-) 42. I don't like myself.
- (-) 43. I don't like being in strange, new situations.
- (+) 44. I have found that I rely on myself in times of need instead of other people.
- (+) 45. Everything works out all right in the end.
- (+) 46. I can adapt easily to new situations.
- (+) 47. I could talk my way out of a traffic ticket.

Table 1.1. -- *Continued*

- (-) 48. I get stressed out easily.
- (-) 49. I find it hard to make new friends.
- (+) 50. Things are never as bad as they seem.
- (-) 51. I am not happy in my current/latest romantic relationship
- (+) 52. I enjoy my job.
- (-) 53. I have gotten as much formal education as I had hoped I would.
- (+) 54. I am respected and admired at work.
- (+) 55. I am lucky at love.
- (+) 56. My significant other (spouse, boy/girlfriend) is also my best friend.
- (+) 57. I do my job better than most people who have the same job as I.
- (+) 58. I gain comfort from my religious faith.
- (-) 59. I am a pessimist.
- (+) 60. I have been successful in my career.
- (+) 61. I have been successful in my romantic relationships.
- (+) 62. I can overcome any obstacle.
- (+) 63. I have been successful in most areas of my life.
- (+) 64. I have always been motivated to do well in school.
- (+) 65. I set high goals for myself that I plan to reach.
- (+) 66. I am a survivor.
- (+) 67. Things usually work out for me in the end.

CHAPTER 2

STUDY 1: ITEM SELECTION AND INITIAL PREDICTIVE VALIDATION

Once a list of possible items was created, the next step was to assess how well the items held together as a cohesive scale. The predictive validity of the scale is more important than its content validity, but the main purpose was to administer the initial version of the scale to as large and diverse a population as possible to collect the important first wave of relevant psychometric data.

The participants in Study 1 were asked for permission to access their academic records so that their cumulative grade point average (GPA), SAT (Educational Testing Service, 2001) scores, and the ACT (ACT, 1991) scores could be studied postdictively. Cumulative GPA is preferable to the GPA from the current or previous semester for two reasons. First, the purpose of the scale is to measure overall academic success; investigating its relationship with cumulative GPA is thus truer to this intent. Second, cumulative GPA should be a more stable score than the GPA from one semester or class. Correlations with cumulative GPA should thus be more stable.

The primary goal of Study 1 was to assess and refine the properties of the ARI. In addition, in my attempt to poll as diverse a college population as possible, it was necessary to keep the amount of active participation to a minimum to encourage as many people to participate. Therefore, Study 1 made no attempt to measure cognitive ability as directly as possible. Instead, it relied on the SAT and ACT scores

that were already present in the students' records to serve as surrogate measures of intelligence. Perhaps not surprisingly, Thorndike (1947) and Longstreth, Walsh, Alcorn, and Szeszulski (1986) found that overall and individual SAT scores and IQ are significantly correlated. In addition, VanTassell-Baska (1986) found that SAT scores could be used reliably to identify intellectually gifted junior high school students. Carvajal, McKnab, Gerber, and Hewes (1989) found that ACT significantly correlated with the Peabody Picture Vocabulary Test-Revised, the Wechsler Adult Intelligence Scale-Revised (WAIS-R), and the Stanford-Binet Intelligence Scale-Fourth Edition. Lewis and Johnson (1985) also found that the ACT correlated with the WAIS-R. Finally, Brodnick and Ree (1995) argued that SAT and ACT scores can be used as measures of Spearman's *g*. Therefore, SAT and ACT scores should suffice as proxy indicators of cognitive ability.

2.1 Method

2.1.1 Participants

Although developmental risk factors appear to have their greatest impact during childhood (Farrington, 1992; Garnezy, 1983; Hawkins, and Lishner, 1987; Hawkins, von Cleve, and Catalano, 1991), resilience is not limited to children (Rutter and Quinton, 1984; Quinton, Rutter, and Liddle, 1984; Staudinger, Mariske, and Baltes, 1995; Werner and Smith, 1977; 1982; 1992). In addition, because the primary goal of the present study is to predict college grades, the participants were limited to people currently enrolled in college courses.

The initial version of the ARI was administered to as diverse a college population as was practical. It was administered to individuals who (a) visited the University of Texas at Arlington (UTA) Counseling and Career Development Office, or (b) visited the UTA Academic Advising Office, or (c) were enrolled in Introduction to Psychology courses. The information in Table 1.2 describes the participants (and their mean ARI scores) from each sample population. The data for three people from the Introduction to Psychology group were discarded because two or more of their responses were impossible or because they did not complete all of the items.

Table 1.2. Description of the Counseling Office, Academic Advising Office, and Introduction to Psychology Populations

Population	Age			ARI Score		
	<i>N</i>	Mean	S.D.	Proportion Female	Mean	S.D.
Counseling Office (Paper Version)						
	15	22.83	4.71	.60	152.13	10.47
Aca. Advising Office (Paper Version)						
	5	19.83	0.81	.40	148.00	43.05
Online Version	64	23.64	6.40	.58	147.85	17.28
Intro. to Psych (Paper Version)						
	231	20.36	1.68	.68	150.71	13.88
Total	315	22.08	5.26	.62	149.75	15.22

2.1.1.1 Counseling and Career Development Office and Academic Advising Participants

Those students who were recruited from the Counseling Office or from the Academic Advising Office did not receive any compensation for their effort. During the summer and fall, their participation was solicited by means of copies of the letter reproduced in Appendix C. During the Fall, students were also able to participate by accessing a secure web site provided by the University. The letter of solicitation to participate via the web site is reproduced in Appendix D. Both methods of participation were offered to the students when they first talked to the receptionist at each office. Two copies of the informed consent sheet (provided in Appendix E) were also included, one for them to keep, one to return with the completed instruments.

2.1.1.2 Introduction to Psychology Subject Pool Participants

Participants from this group were solicited by means of a sign-up sheet on the SPOOL bulletin board, as is normally done for members of this population. Individuals participated to gain one of the five experiment/research credits they needed to complete their Introduction to Psychology course.

2.1.2 Materials

The participants were administered the 67-item pilot version of the ARI. They were also asked to report their age, gender, name, and UTA student identification number and were also asked for permission to access their academic records from the Institutional Research and Planning Office. Included in these data were the students' cumulative GPAs and SAT scores.

2.1.3 Design and Procedure

2.1.3.1 UTA Counseling and Academic Advising Offices Paper Version

When students visited either office to see a counselor, they were given an intake form on a clipboard. The receptionist at each office placed a packet behind the intake form on the clip board that contained (a) the cover letter in Appendix C, (b) a copy of the letter of consent for the student to keep (Appendix E), (c) a copy of the letter of consent for the students to return with the scale, (d) the scale, (e) an NCS® answer sheet, and (f) the debriefing statement in Appendix F. The receptionists were asked to inform the visiting students of the scale and to ask the students to participate if they had time. Students who completed the scale left it with the receptionist. The experimenter visited the offices at least weekly to collect completed scales or, more commonly, to encourage the receptionists to continue soliciting help if no scales had been completed.

2.1.3.2 Online Version (Available at the UTA Counseling and Academic Advising Offices)

In an attempt to encourage participation through another venue, a secure web site was created that contained two pages. To solicit participation via the website, the letter in Appendix D was substituted for the paper version of the ARI that was described in the UTA Counseling and Academic Advising Offices Paper Version section, above. (Paper versions were also available at the offices for students who preferred to use that version).

To access the Internet site, the student had to first enter their name and valid UTA student ID number. On the first page of the site was (a) the cover letter in

Appendix G, (b) the letter of consent in Appendix H, (c) boxes for the student to enter in their name and social security number as signature of the letter of consent, (d) the scale with a drop-down box after each item in which the students could select their response (i.e., *Strongly Agree* through *Strongly Disagree*), (e) radio buttons asking for the student's gender, (f) a drop-down box asking for the student to choose their class level from either *Freshman*, *Sophomore*, *Junior*, *Senior*, *Special Student*, *Graduate Student*, or *Other*, and (g) buttons to either submit their responses or reset (i.e., clear) the web page. All of this information had to be entered before the data could be submitted. When the data were submitted, the respondent was taken to the site's second page, reproduced in Appendix I, which contained (a) a brief thank-you statement with the participant's name, (b) a copy of the letter of consent and encouragement that they print out the web page for their records, and (c) the debriefing statement (also reproduced in Appendix F).

2.1.3.3 Introduction to Psychology Student Version

Posting the web site did increase the number of respondents, but I felt that the data were still not being collected quickly enough, so I solicited additional participation from the pool of Introduction to Psychology students. The participation of the students was solicited by posting sign-up sheets in the usual location for such a task. Up to 20 students at a time came to the testing room and were first given two copies of the letter of consent: one for them to sign and keep, the other for them to sign and return to the experimenter. The scale, an answer sheet, and the debriefing statement in Appendix F

were then passed out to the students to complete. When they had finished, any further questions they had were answered before they were excused.

2.3 Results

Flesch reading ease is based on the average number of syllables per word and the average number of words per sentence, ranging from 0 to 100. Scores of 60 or greater are typically considered sufficiently easy for most adult audiences to read. The Flesch reading ease for the initial scale (including the instructions) was 85.5. The initial, 67-item version of the ARI is given in Table 1.1.

Responses to items on the pilot scale keyed in the positive direction (i.e., those marked with (+) in Table 1.1) were scored such that *strongly agree* was assigned 5 points, *agree* was assigned 4, *neither agree nor disagree* was assigned 3, *disagree* was assigned 2, and *strongly disagree* was assigned 1 point. Items keyed in the negative direction (i.e., those marked with (-) in Table 1.1) were scored conversely. Scores on the ARI were calculated by summing the responses to the individual items. Higher ARI scores are intended to imply greater academic resilience.

Table 1.2 reports the number of responses, mean, and standard deviation for the ARI scores for the different populations. As can be seen in this table, the ARI mean scores ranged from 147.85 ± 17.28 (i.e., $17.28 = 1$ standard deviation) for those who participated via the on-line site to 152.13 ± 10.47 , for those solicited from the Counseling Office. A one-way ANOVA examining differences between these population means detected no reliable differences ($F_{3, 306} = 1.30$, $MSE = 228.64$, n.s.), even when the participants from the Counseling and Academic Advising Offices were

combined to help correct for the large differences in sample sizes ($F_{2, 306} = 2.29$, $MSE = 228.10$, n.s.).

2.3.1 Scale Development

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. Included in these 40 items are all 31 items with item-total correlations greater than .40, a typical cut-off for item retention during item selection. There was also an overall tendency for the participants to respond "favorably" (i.e., indicate more possible academic resilience) to all items (i.e., that they agree with favorable items and disagree with unfavorable ones). Most of the item means hovered around 2. The last nine items were added to the scale despite their lower item-total correlations because they helped lower the mean ARI score. An item would be most able to detect academic resilience around its mean response, so adding items with lower mean responses would help the ARI detect lower levels of academic resilience.

Scores on the ARI could range from 40 to 200. The mean score on the ARI in Study 1 was 149.75 ± 15.22 . Table 1.3 presents the mean, standard deviation, and item-total correlations for all 67 items from Study 1.

Table 1.3. Descriptive Statistics of the ARI for both Studies 1 and 2. There were a total of 315 participants in Study 1, 251 in Study 2, 176 in Study 3, and 272 in Study 2. The results reported here for Study 2 are for the 259 who completed all 40 items of that version of the ARI. Item number is the number on the original version.

Item Number and Content	Study 1			Study 2		
	Mean	S.D.	r_{it}	Mean	S.D.	r_{it}
1 I like learning new things.	1.49	0.68	.38			
2 If I'm in trouble, someone usually helps me out.	2.29	0.92	.13			
3 I get excited when new opportunities arise.	1.80	0.76	.41	1.78	0.73	.23
4 If I am feeling very bad, there is somewhere I can go to get away for a while.	2.31	1.05	.29			
5 I can make people laugh.	1.74	0.72	.37			
6 I have at least one very close friend.	1.58	0.92	.44	1.42	0.73	.07
7 If I have a problem, I usually let it take care of itself.	3.28	1.10	-.19			

Table 1.3. -- *Continued*

8	I don't like to go to school.	2.53	1.07	.25			
9	When I need help, there never seems to be anyone around.	3.65	1.08	-.48	3.76	1.05	-.19
10	There's a lesson to be learned from every situation.	1.92	1.01	.54	1.72	0.78	.27
11	Most of the problems in my life are too big to be solved.	2.03	0.96	.54	4.08	0.89	-.35
12	I don't like trying new things.	2.09	0.99	.42	4.02	0.92	-.15
13	I usually look at the bright side of things.	2.27	0.93	.40	2.29	0.97	.30
14	If I have a secret, there is someone I can tell who I know won't tell anyone.	2.03	1.07	.34			
15	I usually learn from my mistakes.	2.23	0.99	.48	2.07	0.81	.28
16	If my parents can't help me, I have no other adults I can turn to for help.	2.23	1.09	.38			
17	I don't have strong faith in my religion.	2.37	1.25	.34			
18	Other people tend to rely on me to get things done.	2.34	0.98	.37	2.19	0.88	.18
19	The more things change, the more they remain the same.	3.01	1.01	.02			
20	I don't have many friends.	2.31	1.18	.24			
21	I don't like taking on new responsibilities.	2.67	1.16	.43	3.48	1.02	-.29
22	If I really want to do something, I can do it.	1.73	0.77	.51	1.65	0.73	.25

Table 1.3. -- *Continued*

23	I like solving problems.	2.05	0.94	.36	2.28	0.98	.23
24	I would make a good parent.	1.82	0.94	.45	1.74	0.88	.28
25	I seek out older people to gain wisdom from their experiences.	2.23	0.93	.34			
26	I can easily find people to help me when I need it.	2.29	1.04	.49	2.15	0.91	.18
27	There is no one in my life who takes good care of me.	2.06	1.17	.54	4.39	0.93	-.10
28	If bad things happen to me, it can really bring me down.	3.29	1.06	.22			
29	I prefer it when things are stable and unchanging.	2.75	0.99	-.16			
30	I am always busy doing things.	2.12	0.94	.32			
31	If I have a problem, I'd rather handle it on my own.	2.32	0.96	.13			
32	There is no situation I could not overcome.	2.33	1.01	.45	2.33	1.14	.38
33	When I'm in trouble, there is always someone I can turn to for help.	1.94	0.90	.37			
34	I can usually take care of myself.	2.07	0.95	.44	1.79	0.81	.27
35	I often don't think that I deserve to succeed.	2.31	1.19	.46	4.05	1.07	-.28
36	Even though stuff can go wrong, things usually work out in the end.	1.92	0.82	.41	1.91	0.82	.40
37	I have a role model (someone I look up to and admire).	2.23	1.10	.36			

Table 1.3. -- *Continued*

38	I don't mind when things in my life change (like moving somewhere to a new neighborhood, or going to a new grade level).	2.43	1.05	.25			
39	I have high expectations for myself.	1.99	1.15	.53	1.72	0.87	.33
40	I'm not the parental type.	2.22	1.16	.37	4.02	1.06	-.24
41	I look at problems as challenges to be overcome, not things to avoid.	2.55	1.09	.55	2.35	0.92	.41
42	I don't like myself.	1.95	0.99	.53	4.19	0.98	-.37
43	I don't like being in strange, new situations.	2.85	1.03	.24			
44	I have found that I rely on myself in times of need instead of other people.	2.34	0.94	.13			
45	Everything works out all right in the end.	2.02	0.80	.42	1.98	0.83	.39
46	I can adapt easily to new situations.	2.29	0.86	.54	2.13	0.88	.33
47	I could talk my way out of a traffic ticket.	2.99	1.16	.14			
48	I get stressed out easily.	3.23	1.20	.10			
49	I find it hard to make new friends.	2.66	1.18	.35	3.63	1.17	-.29

Table 1.3. -- *Continued*

50	Things are never as bad as they seem.	2.35	0.96	.46	2.37	0.90	.34
51	I am not happy in my current/latest romantic relationship	2.85	1.23	.14	3.47	1.32	-.20
52	I enjoy my job.	2.86	1.12	.33	2.62	1.08	.20
53	I have gotten as much formal education as I had hoped I would.	2.76	1.18	.27	3.35	1.16	.06
54	I am respected and admired at work.	2.64	1.00	.41	2.17	0.75	.34
55	I am lucky at love.	3.02	1.14	.08			
56	My significant other (spouse, boy/girlfriend) is also my best friend.	2.63	1.22	.07			
57	I do my job better than most people who have the same job as I.	2.54	1.02	.19	2.25	0.87	.25
58	I gain comfort from my religious faith.	2.69	1.32	.41	2.16	1.17	.29
59	I am a pessimist.	3.22	1.13	-.34	2.43	0.80	.40
60	I have been successful in my career.	2.75	1.00	.33			
61	I have been successful in my romantic relationships.	2.67	1.16	.09			
62	I can overcome any obstacle.	3.73	1.03	-.44	2.14	0.92	.49
63	I have been successful in most areas of my life.	2.21	0.96	.62	2.06	0.81	.50

Table 1.3. -- *Continued*

64	I have always been motivated to do well in school.	2.35	0.88	.55	2.25	1.19	.33
65	I set high goals for myself that I plan to reach.	2.35	0.78	.50	1.87	0.92	.39
66	I am a survivor.	1.96	0.56	.40	1.76	0.86	.37
67	Things usually work out for me in the end.	2.13	0.46	.53	1.91	0.80	.41

2.3.2 Validation of ARI

Cumulative GPAs (mean = 2.82 ± 0.74) were obtained for 129 participants, and SAT scores (mean = 1066.00 ± 140.93) were obtained for 156 participants, but SAT and GPA were jointly available for only 80 participants. The scores on the 40-item, revised ARI correlated modestly but significantly with cumulative GPA ($r = .21, p < .05$).

A pair of hierarchical linear regressions assessed how much ARI scores added to the prediction of cumulative GPA made by SAT math and verbal scores. The overall model including SAT math, SAT verbal, and ARI scores was significant ($F_{3, 80} = 332.48, \text{MSE} = 0.62, p \ll .05$). When the ARI term was added to the model ($\beta = -.04$), the R^2 changed from .928 to .930. This was not a significant change in R^2 ($F_{1, 77} = 2.41$), but a power analysis indicated that a sample size of 277 participants should produce a significant, though undeniably weak, effect (at $1 - \beta = .95$). Table 1.4 provides the R^2 s, F s, dfs , and beta weights for these two models.

Pairs of hierarchical linear regressions were also used to assess the ability of the ARI scores to predict the components of cumulative GPA assessed in the first pair of linear regressions just discussed. The present and past GPAs, as well as science and humanities GPAs were used as dependent variables in pairs of multiple regressions testing the significance of adding ARI scores to models already containing SAT math and verbal scores.

A model predicting present GPA that contained SAT math and verbal scores and ARI scores as predictors was significant ($F_{3, 165} = 6.97, \text{MSE} = 0.43, p \ll .05$). Adding the ARI term ($\beta = .034$) to the model improved the fit--the R^2 changed from .111 to

.112—but not significantly ($F_{1,165} < 1$). A similar model predicting past GPA (with SAT and ARI scores) with both SAT and ARI scores was not significant ($F_{3, 148} = 1.89$, MSE = 0.44, n.s.).

ARI scores did not add to the prediction of the GPAs of either cumulative science or humanity classes. The model predicting cumulative science GPA from SAT and ARI scores was significant ($F_{3, 165} = 8.62$, MSE = 0.74, $p \ll .05$), but the increase in R^2 (from .132 to .135), was not ($F_{1, 148} = 1.89$, MSE = 0.74, n.s.). The same held true for humanities grades, where the increase in the R^2 (from .48 to .058), was not significant ($F_{1, 161} = 1.77$, MSE = 0.48, n.s.), even though the overall model containing SAT and ARI scores was ($F_{3, 161} = 3.30$, MSE = 0.48, $p < .05$).

Table 1.4. Summary of Results from Study 1 Linear Regressions. 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.

							β Weights
							SAT
R^2	F	k	N	Math	Verbal	ARI	
.93	2.41	3	80	.75	.25	-.04	
.93		2	80	.73	.24	-	

2.4 Discussion

The results of an item analysis were applied to create a shorter version of the original instrument. Some support for the predictive validity of it was secured when the ARI was found to correlate significantly with cumulative GPA. Unfortunately, the ARI added little to the SAT's prediction of GPA. This conclusion is tenuous, however, given the small sample size ($n = 80$) available for the linear regression model. A power analysis suggested that the ARI would significantly contribute to SAT's prediction of GPA given a much larger sample size ($n = 277$).

There are at least two reasons to believe that the ARI merits further study. First, the ARI was significantly correlated with GPA, and thus can be used to predict GPA in at least some situations. Second, using SAT as a measure of cognitive ability is not a sufficient test of the ARI's validity because the variance in SAT scores arises from sources other than cognitive ability.

CHAPTER 3

STUDY 2: VALIDATION OF THE ARI

Study 2 was conducted to evaluate the ARI's predictive and construct validity. The analysis of the ARI's predictive validity centered on the instrument's ability to predict academic success--primarily measured as cumulative college GPA--beyond the extent to which academic success is already predicted by cognitive ability. The ability of the ARI to predict academic success was also compared with that of other, relevant constructs, such as motivation and personality. In other words, it is not enough that the ARI predicts academic success, it must make a unique contribution to its prediction.

The ARI was created as an initial effort to standardize and quantify resilience, specifically academic resilience. Because the crux of resilience is its relation to life barriers and stressors, the ability of the ARI to moderate the effect of barriers and stressors on academic success is an important test of its construct validity. Specifically, the possible moderating influence of the ARI should manifest itself as an interaction between ARI scores and measures of barriers and stressors when predicting academic success.

3.1 Predictive Validity

3.1.1 The ARI's Predictive Validity Vis-à-Vis Cognitive Ability

Study 2 measured the ARI's predictive validity in relation to GPA while also measuring the scale's divergent validity in relation to cognitive ability and to apposite personality constructs, discussed below. The cognitive abilities measure that was used is Sternberg's (1991c) Sternberg Triarchic Abilities Test–Modified: Abbreviated Version (STAT-M). Sternberg and his colleagues (1984; 1988; 1991a; 1991b; 1991c; 1993; 1998; Sternberg, Grigorenko, Ferrari, and Clinkenbeard, 1999; Sternberg, Wagner, Williams, and Horvath, 1995) have argued that in addition to the “academic,” or “analytic,” intelligence tested in such contexts as traditional math courses, individuals may have other, largely unrelated types of intelligence. Of particular interest here is what Sternberg called “practical” intelligence, which includes “action-oriented knowledge, acquired without direct help from others, that allows individuals to achieve goals they personally value” (Sternberg, et al., 1995, p. 916). Although cognitive ability, when operationalized as IQ, might be a component of academic resilience (Anthony, 1987; Masten, Hubbard, Gest, Tellegen, Garmezy, and Ramirez, 1999; Radke-Yarrow and Sherman, 1990; Worland, Weeks, and Janes, 1987), it might not be academic intelligence that helps people overcome adverse events (outside of such places as adversely difficult math classes), but instead the ability to assess in practical terms what needs to be done in a given situation, and then to choose the best of several possible options. In other words, Sternberg's concept of practical intelligence might better capture the cognitive skills that resilient individuals use to overcome problems than does IQ (Sternberg, Forsythe, Hedlund, Hovarth, Wagner, Williams, Snook, and Grigorenko, 2000).

The third of Sternberg's (e.g., 1991c) types of intelligence is "creative" intelligence. Whereas analytic intelligence assesses one's ability to find the single best answer (e.g., the correct solution of a math problem), creative intelligence measures one's ability to find a unique or previously underutilized solution. It is possible that creative intelligence would result in academic resilience when the best way around a barrier that has stymied others has simply yet to be found. At least part of academic resilience may be the ability to find new ways to solve common problems.

3.1.2 The ARI's Predictive Validity Vis-à-Vis Personality

Several of the items retained in the 40-item version of the ARI appear to measure ambition, reliability, initiative, self-motivation, self-confidence, etc. Therefore, Study 2 also assessed the ARI's relation to a measure of reliability, discussed next, and to a measure of self-motivation, discussed below. Several items on the ARI have a patently socially desirable content (e.g., agreeing that "I have been successful in my career"), so Study 2 also investigated the ARI's relation to social desirability.

3.1.2.1 The Big Five

Given the content of several of the retained items, it is possible that the scale may actually be measuring, at least in part, what Goldberg (1981) termed "Conscientiousness," a construct which includes such concepts as impulse control, punctuality, and the desire to work assiduously. There is reason to measure Conscientiousness beyond concerns about the ARI's divergent validity with that construct. Busato, Prins, Elshout, and Hamaker (2000) reported finding that

Conscientiousness was a consistent predictor of test grades and retention among undergraduate psychology students.

In addition, other Big Five (Goldberg, 1981)--or OCEAN (McCrae and Costa, 1986, 1987; 1996)--traits may influence academic success or scores on the ARI. For example, Sanchez, Rejano, and Rodriguez (2001) found that Extroversion, Neuroticism, and Openness influenced college grades, and Blickle (1996) found that the Big Five accounted for 17% of the variance of scholastic scores of adult students. Therefore, the personality variables that will be entered into the model are those assessed by a Big Five instrument designed to measure broad-spectrum dimensions of human personality.

3.1.2.2 Self-Motivation

In addition to the personality variables constructs included in the model, more focused measures were added: a measure of self-motivation and a measure of social desirability. Dishman, Ickes, and Morgan (1980) noted that although motivation had been often cited as an important contributor to adherence to an exercise plan, the construct of motivation in this domain remained vague and poorly operationalized. They therefore created the Self-Motivation Inventory (SMI), and tested its ability to predict adherence to an exercise regimen. Their instrument asks the respondent to indicate, on a 5-point Likert scale, the extent to which the 40 self-motivation-related items are *extremely characteristic of me* to *extremely uncharacteristic of me*.

The SMI displayed high internal and high test-retest reliability (α s ranging from .86 to .92 in various samples). It also showed strong predictive validity. It significantly predicted attrition in a seven- or eight-month long, rigorous rowing program for women.

The SMI also predicted the recidivism of men involved in various cardiovascular and muscular endurance programs (Dishman, Ickes, and Morgan, 1980; Dishman and Ickes, 1981). Also measured in this study were Sonstroem's (1974, cited in Dishman, Ickes, and Morgan, 1980) Physical Estimation and Attraction Scales, Wallston, Wallston, Kaplan, and Maides' (1968, cited in Dishman, Ickes, and Morgan, 1980) Health Locus of Control Scale, and Kenyon's (1968 cited in Dishman, Ickes, and Morgan, 1980) Attitude Toward Physical Activity Scale. The SMI was the only of these psychological measures to contribute significantly to a stepwise regression prediction of adherence to the exercise regimens.

The SMI was also found to be largely unrelated to Crowne and Marlowe's (1964) Social Desirability Scale (MCSD), but better related to Thomas and Zander's (1973) Ego-Strength Scale. Being related to, but not synonymous with, the Thomas-Zander Ego-Strength Scale indicated that the SMI had good convergent validity, being relatively unrelated to the MCSD (accounting for less than 13% of the variance in the SMI) implied that the SMI had divergent validity (Dishman, Ickes, and Morgan, 1980; Dishman and Ickes, 1981).

Subsequent articles also reported that the SMI was useful in predicting adherence to exercise regimens (Heiby, Ontario, and Sato, 1987; King, Blair, Bild, Dishman, Dubert, Marcus, Oldridge, Paffenbarger, Powell, and Yeager, 1992; Kirschenbaum, 1984; Robinson and Carron, 1982; Shephard, 1985). Dishman and Ickes (1981) suggested that the SMI may apply to other domains besides exercise. Bull (1991) found that the SMI could predict an athlete's adherence to a mental skills

training program, in which such things as relaxation, visualization, and positive thinking are practiced. In addition, the SMI was found to predict perseverance and success in various smoking cessation programs (Harackiewicz, Sansone, Blair, Epstein, and Manderlink, 1987).

A factor-analysis conducted by Merkle, Jackson, Zhang and Dishman (2002) suggests that the primary component of the SMI is one's commitment to a task or regimen. The instrument also included what were termed Lethargy (e.g., "I'm not likely to put myself out if I don't have to"), Drive (e.g., "Whenever I reach a goal I set a higher one."), Persistence (e.g., "I can persist in spite of pain or discomfort."), Reliability (e.g., "If I tell someone that I will do something you can depend on it being done."), and Discipline (e.g., "I'm good at keeping promises especially ones I make to myself.").

Because the SMI has been shown to be a valid measure of self-motivation in several, rather divergent areas, it might be relevant to the current study. Specifically, because some items on the ARI assess ambition and productivity, the ARI and the SMI might address similar domains. There is some empirical evidence to support this conjecture. First, as mentioned above, Wagnild and Young (1993) argued that self-reliance and perseverance, among other factors, are characteristics of resilience. Second, Pain and Sharpley (1986) found that the SMI significantly differentiated among those who did and did not complete a college course in psychological counseling. The ability of the SMI to predict task performance has not been established (Boyce and Wayda, 1994), but perseverance and achievement motivation are important

contributors to at least some areas of academic success (Busato, Prins, Elshout, and Hamaker, 2000; Eison, Pollio, and Milton, 1986; Rheinberg, Vollmeyer, and Rollett, 2000; Sharpley and Pain, 1987; Zimmerman, Bandura, and Martinez-Pons, 1992).

It is possible that the ARI and the SMI both measure motivation, but tap different facets or components of motivation. Therefore, in addition to unique contributions (to the prediction of academic success) either of these instruments may make, there may also be some common, overlapping variance.

3.1.2.3 Social Desirability

In creating the ARI, I did not attempt to conceal what the instrument was designed to measure. Because many of the items clearly ask about the extent to which a person displays socially desirable behaviors (e.g., “I usually learn from my mistakes.”), Crowne and Marlowe’s (1964) Social Desirability Scale was included to allow me to factor out of ARI scores the variance accounted for by social desirability. A potential complication is that high ARI scores are more influenced by concerns about social desirability than lower scores. In other words, the relationship between the two constructs may not be linear. For this reason, the ARI x MCSD interaction term was tested to determine whether different levels of ARI scores were differentially influenced by MCSD scores.

3.1.3 Summary of the Predictive Validity Hypotheses

Garmezy, Masten and others (Garmezy, 1985; Garmezy and Masten, 1991; Masten, Hubbard, Gest, Tellegen, Garmezy, and Ramirez, 1999; Radke-Yarrow and Sherman, 1990) argue that resilient children tend to be intelligent, but academic

resilience as it is conceived here is defined as containing faculties other than cognitive ability. The goal of Study 2 was to determine whether the ARI adds to the prediction of academic success made by cognitive ability. For this reason, scores on the STAT-M subtests (i.e., the operationalization of cognitive ability) were the first set of terms added to the models analyzing the predictive validity of the ARI.

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, so personality measures comprised the remaining additions to the models, described below, that test the predictive validity of the ARI. The first personality scores that were added to the model were measures of broad domains: the Big Five traits.

In addition to the Big Five's dimensions, two more specific aspects were measured in Study 2. Both previous research (Byers, 1962; Wagnild and Young, 1990) and *prima facie* consideration of several of the items on the ARI suggest that motivation may be an integral component of academic resilience. Therefore, the SMI was entered next into the model.

Because responses to items might be influenced by one's tendency to respond in a socially desirable manner, the MCSD was also included. After adding the terms for the SMI x ARI and MCSD x ARI interactions and the intercept, there were 13 terms in the full model. Even with so many other terms in the model, I predict that the ARI will make a significant and unique contribution to the prediction of academic success.

The regression analyses assessing the effect of ARI scores on academic success also found that Openness was reliably predictive of academic success. The influence of

Openness on academics is unclear. Sanchez, Rejano, and Rodriguez (2001) found that those who scored high on the Openness trait tended to have low grades in college. Dollinger and Orf (1991), on the other hand, found that Openness predicted high scores on college grades and on standardized tests.

The results reported below suggested that Openness influences academic success in college more strongly than academic success in high school. It is possible that those who are open to new ideas are better able to handle the more diverse and complex material presented in college. There are at two ways that the effect of Openness could be investigated further. First, the positive influence of Openness on academics might manifest in the breadth of exposure students have in college. This broader knowledge base might in turn provide a richer contextual background for the assimilation and communication of subsequent knowledge, and thus lead to greater academic success. Evidence for a broader exposure in college might manifest as (a) taking more classes outside of one's major, or (b) participating in more extra-curricular, school-based activities.

Second, those with higher Openness scores may be more motivated to learn the information provided them in whatever setting they find themselves. Openness scores in the present study did not correlate strongly with SMI scores, suggesting that if this theory is correct that Openness is related to a different type of motivation. One way of testing whether Openness translates into increased motivation is to assess the correlation between Openness scores and the number of books students check out of the library.

Unfortunately, the significance of Openness scores on present and cumulative GPA were not expected, so the further investigation of its effect on academic success was conducted in a truly *post hoc* fashion. One consequence of this was that I did not ask for consent to access information outside of the IRP office; access to information about library books checked out or about participation in extra-curricular activities was not obtainable. It was possible, however, to investigate the relation between Openness and the proportion of classes taken outside of one's major. The proportion was determined by summing the number of classes one took outside of the major declared in the IRP records; this sum was divided by the total number of classes taken. Note that I was not able to determine whether students changed their major. In addition, proportions were not calculable for the students whose majors were undeclared.

3.1.4 Stressors

Two possible measures of stressful life events were considered: (a) measures of hassles (and uplifts) and (b) measures of major life events. Measures of hassles, defined as "familiar daily stresses... often taken for granted because they seem relatively unimportant compared with major life events" (Lazarus and Folkman, 1984, p. 311), such the Hassle Scale (Kanner, Coyne, Schaefer, and Lazarus, 1981), the Inventory of College Students' Recent Life Experiences (Kohn, Lafreniere, and Gurevich, 1990), the Brief College Student Hassles Scale (Blankstein, Flett, and Koledin, 1991), and the Life Events Survey (Sarason, Johnson, & Siegel, 1978), purport to measure the large and small stressors that have occurred in the recent past (Gruen, Folkman, & Lazarus, 1988). These scales has the advantage of providing a detailed profile of the stressors

affecting a respondent but at the expense of requiring the researcher to administer a lengthy instrument.

The dominant measure of major, stressful, largely non-academic life events is Miller and Rahe's (1997) Recent Life Changes Questionnaire (RLCQ). This scale does not inquire about as many events as do most hassle scales, but it appears to be useful for assessing those stressful events that occur over longer periods of time (Rowlinson and Felner, 1988). In the present study, the RLCQ was preferable to a measure of hassles for two reasons. First, the stressful events it measures might affect one's physical and psychological health for months (Rahe, Mahan, and Arthur, 1970), rather than weeks or days. Second, the events catalogued in the RLCQ (such as the death of a close family member, divorce, detention in jail, etc.), more closely match those traumatic events overcome in resilience research (e.g., Bettelheim, 1986; Garnezy, 1983; Werner and Smith, 1992). Therefore, the RLCQ was used to measure stressful life events that the participants have experienced within the last year.

Miller and Rahe's (1997) RLCQ is a revision of Rahe's (1975) Schedule of Recent Experience (SRE). The SRE itself was based on the same list of life events that produced the Holmes and Rahe's (1967) celebrated Social Readjustment Rating Scale. The RLCQ comprises 30 of the items from the SRE, with 44 new items.

The purpose of all three instruments is to quantify the amount of stress one has experienced in the last year or two that came from major changes in one's life, such as marriage or the death of a loved one. These scales weigh the significance of an event with a standardized scores called life change units (LCUs). The amount of stress one

experiences from marriage was arbitrarily set to be weighted with 50 LCUs. Other events were given LCU weights based on the perceived stress they caused relative to marriage. For example, the death of a parent was reported to be twice as stressful as marriage, and so was weighted with 100 LCUs.

This same weighting system was used to compute the RLCQ scores for the participants in this study. The participants reported which life events on the RLCQ they had experienced within the past year. Each life event that the participant had experienced was then given the appropriate LCU based on the results of Miller and Rahe's (1997) weightings of the items. The LCUs for a given participant were summed to obtain that person's RLCQ score.

3.1.5 Barriers

Poverty imposes a web of life barriers such as frequently inadequate prenatal care (Neisser, et al., 1996); malnutrition (Pollitt, Gorman, Engle, Martorell, and Rivera, 1993; Ricciutti, 1993; Schoenthaler, Amos, Eysenck, Peritz, and Yudkin, 1991); exposure to environmental toxins such as lead (Baghurst, et al., 1992; Needleman, Geiger, and Frank, 1985); exposure to social pathologies like violence, suicide, gangs, and teen pregnancy (National Commission on the Role of the Schools and the Community in Improving Adolescent Health, 1990); lack of immunization (Nettles and Pleck, 1996); and impoverished community facilities and support (Thompson, Kaslow, Short, and Wyckoff, 2002). The deleterious situations common in poverty can affect cognitive ability (Gottfried, 1984) and academic success (White, 1982). For this reason, the participants in Study 2 were also asked to respond to two items that, when their

scores were combined, yielded a measure of economic status (ES). The two items which together determined ES were administered along with the ARI as items 41 and 42 (presented in Appendix J). Item 41 asked for the yearly income for the participant's household. Item 42 asked how many people lived in the participant's household. The yearly salary was divided by the number of people living in the house to determine the ES, the amount of money available for each member of the participant's home.

Although differences in the academic performance between African Americans and White Americans appears to be decreasing (Grissmer, Kirby, Berends, and Williamson, 1994; Neisser et al., 1996), they are still evident (Balfanz, 2000; Jensen, 1985). Membership in what Ogbu (1978; 1994) called a "caste-like" minority (i.e., involuntary membership in a politically or economically subordinated group, such as African Americans or Native Americans in the U.S.) can be considered to be a barrier to academic success (Nettles and Pleck, 1996). The self-reported "ethnicity" of the participants was available from the UTA IRP, and was added into the models as a life barrier. (In fact, the categories for ethnicity include some, like "Native American" and "International," that are not actual ethnicities.)

3.1.6 Construct Validity Hypotheses

One criterion that was used to determine the ARI's construct validity was the GPA for the semester in which the data were collected. Cumulative GPA, SAT combined scores, ACT combined scores, and high school rank were used as additional criteria. Stressors would not rationally postdict academic success (and the effect of

academic success on subsequent life stress is beyond the scope of study), so the RLCQ was only used in the model predicting present GPA.

There are two dominant views about the relationship between resilience and life barriers. Masten (Masten 1994b; Masten, Best, and Garmezy, 1990) argued that resilience is the successful adaptation to and recovery from exceptionally disadvantaged situations. Masten 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, Werner and her colleagues (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.

There is a third theory about the mechanisms of resilience postulated by writers such as Staudinger, Mariske, and Baltes (1995), but this third theory was not investigated. This third theory proposes that resilience can be compared to a reservoir from which one can draw to buffer oneself against barriers. The larger the reservoir, the more barriers and stress one could endure before finally succumbing. Until the hypothetical reservoir is depleted, this theory would make predictions similar to those of Werner et al. (e.g., Werner and Smith, 1984). Because all of the participants in the

present study demonstrate at least some success in that they have made it to college, there is little opportunity to distinguish this theory from Werner et al.'s theory.

All three theories imply that resilience should buffer academic success from stressors and life barriers. Higher levels of resilience should be associated with attenuated effects of life barriers on academic success. Here, higher ARI scores should predict a smaller correlation between (a) RLCQ scores and GPA and between (b) ES and GPA. In other words, ARI scores and RLCQ as well as ARI scores and ES should interact such that the relationship between RLCQ scores and GPA and between ES and GPA should depend on ARI scores.

In order for resilience to buffer academic success from life barriers, life barriers should otherwise (negatively) affect academic success. Therefore, there should be a main effect for the RLCQ and ES in a model predicting GPA. It is not necessary to obtain a main effect for the RLCQ and the ES terms to test the ability of the ARI to moderate RLCQ scores (for that, the interaction term is necessary), but the lack of an effect for the RLCQ and ES terms would undermine the theoretical significance of an ARI x RLCQ or an ARI x ES interaction.

Finally, there may be a main effect for ARI scores: the ARI may measure the ability of the participants to succeed academically independent of any stress they may have experienced or be experiencing. Such a finding would not directly support the validity of the ARI as a measure of academic resilience, but it would further support the ARI's ability to predict academic success.

In summary, tests of construct validity centered on the ability of the ARI to predict academic success when aspects of stressors and/or life barriers are added to the model. To test this expanded model, the Study 2 participants were asked to supply (a) responses to the ARI, (b) responses to a measure of stressful life events, (c) economic status (ES), (d) responses to a social desirability measure, and (e) consent to allow access to their academic records, from which their ethnicities were obtained.

3.2 Method

3.2.1 Participants

A priority of the first study was to maximize the heterogeneity of the participating college students. It was still important to maintain a variety of participants in Study 2 to obtain a large range of responses in the second study; however, the participants solicited from Introduction to Psychology classes in the first study appeared to be about as varied as those solicited from the other two sources in Study 1. Therefore, in the second study, participants were solicited from the Introduction to Psychology classes. If this source of participants had not provided enough participants, then participants would have been solicited from the general university population if possible. A sufficient number of Introduction to Psychology students, 272 (185 of which were female), did participate in Study 2, so we did not solicit participation from the larger student population.

3.2.2 Materials

Given the large number of instruments the participants were asked to complete, data were collected in two phases. In the first phase, the students were administered: (a)

the analytic and practical subtests of the STAT-M (Sternberg, Grigorenko, Ferrari, and Clinkenbeard, 1999); (b) Sulloway's (2000) Big Five personality factors scale; (c) Dishman, Ickes, and Morgan's (1980) SMI; and (d) the 40-item ARI from Study 1 along with questions about their annual income and family size. In the second phase, the students were asked to complete: (a) the creative subtest of the STAT-M, (b) Miller and Rahe's (1997) RLCQ, and (c) Crowne and Marlowe's (1964) MCSD. The instruments were completed by the participants in the order in which they are presented here (e.g., the Big Five was completed right after the STAT-M). The ARI and additional questions about economic standing are provided in Appendix J. The responses to all four instruments were recorded on NCS® answer sheets provided with the instruments. In the informed consent form (reproduced in Appendix K), students were also asked for permission to access their UTA academic records.

3.2.2.1 Criteria of Academic Success

The academic records to which we had access from the authorization given by the participants (see the informed consent sheet, in Appendix K) furnished not only the students' cumulative GPA, but other items that we believed might also serve as criteria of their academic success. These items included the student's SAT (total and subtest) scores, ACT (total and subtest) scores, and their high school rank. Although cumulative GPA remained the primary measure of academic success, all of these items were used individually as criterion variables in separate linear regression models.

3.2.2.1.1 Grade Point Averages (GPAs)

Course letter grades were transformed into number grades in the conventional sense (viz., A = 4). Cumulative GPA was calculated in the traditional sense as well, by summing grade points and dividing by the number of classes. Grades and credit hours for classes with letters grades other than A, B, C, D, or F--such as W (withdrawal), X (incomplete), T (transferred course), and P (pass)--are not used in the computation of GPA.

The primary measure of GPA was cumulative GPA. In addition, cumulative GPA was divided in two different ways. First, cumulative GPA was divided into present GPA and past GPA. Present GPA was the GPA for the semester during which data were collected. Past GPA was the GPA for all semesters before the one in which the participants completed the study.

Second, cumulative GPA was divided based on course subject. Here, all math and science classes (for all semesters) were aggregated into one score and business and humanities classes were aggregated into another score. The courses which comprised each category are listed in Appendix L. Personal experience suggests that math and science classes tend to be difficult for more students than are humanities classes. In addition, the resources and skills that allow one to succeed in math and science classes might differ from those that allow one to succeed in humanities classes. Both of these hypotheses were tested in Study 2.

3.2.2.1.2 SAT

The SAT is published by the College Board, a not-for-profit association that was founded in 1900. The SAT was first administered to 8,040 students in 1926; during the 2000-2001 school year, it was administered to approximately 2 million U.S. students (College Board, 2001). The SAT consists of three verbal and three math sections. (An additional section, that may test either verbal or math is also included, but responses to this additional section are used to establish normative data for later test development and does not affect the respondent's SAT score.) Each math or verbal section contains between 15 and 40 multiple choice items. Some math sections also contain "student generated" responses in which the student produces a numerical (ratio-level) response instead of a multiple choice response. Scores from the three sections (be they verbal or math) are summed and transformed to a score that ranges from 400 to 800. In 2001, the mean verbal score was 506, and the mean math score was 514 (College Board, 2001).

The SAT is used by approximately 80% of U.S. colleges and universities as a selection factor in the admissions process. Given its role in deciding college admission, it was used here as a measure of academic success.

3.2.2.1.3 ACT

The ACT is a standardized test published by ACT, a not-for-profit company formerly named the American College Testing Program. The American College Testing Program was founded in 1959 to create a standardized test that could be used to evaluate college applicants on a wide range of abilities, which the SAT was not considered able to do. According to the ACT website, "[t]he ACT Assessment® is

designed to assess high school students' general educational development and their ability to complete college-level work" (ACT, 2002). The ACT was based on the Iowa Tests of Educational Development at the University of Iowa. The tests cover English, mathematics, reading, and reasoning applied to science material. It contains 215 multiple-choice items (ACT User Handbook, 1991).

Scores were available from the UTA IRP office for the Math and English sections. Unfortunately, ACT scores were available for only 79 participants (about half as many as had SAT scores).

3.2.2.1.4 High School Rank

High school rank was determined by dividing a participant's high school standing (i.e., how far from the top student was the participant; e.g., a "2" indicated that the participant graduated second in his or her class) by the size of the high school, graduating class (i.e., total number of students in the participant's graduating class). Both high school standing and high school size were available from the participants' academic records at UTA.

3.3 Procedure

Both phases of the study were conducted identically. The phases differed only in the instruments the participants were asked to complete. Groups of up to 20 participants were tested at a time. The students were informed of the study's intent and questionnaire materials, and were asked to sign the informed consent form reproduced in Appendix K. The participants were told that they were being asked to complete a series of established measures of cognitive ability and personality. They were also told

we would test how well these measures related to each other and to their academic performance.

After returning one copy of the informed consent sheet (in Appendix K) and keeping another copy of it for their records, the participants were given a packet containing all of the instruments for that phase, but were asked not to open the packet until told. The participants were guided through preparing the answer sheet and were then given instructions about completing the instruments that were included in that phase. The participants were then asked to complete the instruments.

After the participants had finished, they were given the opportunity to ask any questions. They were also offered the debriefing sheet in Appendix M, which further explains the study and procedure. If they had any questions about the study or the debriefing sheet, those questions were answered.

3.4 Results

3.4.1 Criteria for Elimination of Participants and Data

If a participant responded with an option that was not available for the given instrument (e.g., responding “c” to an instrument for which only “a” and “b” were allowed), then the participant’s data for that scale were eliminated. The MCSD data for one participant was eliminated by this criterion.

Some of the stressors on Miller and Rahe’s (1997) Recent Life Changes Questionnaire (RLCQ) are very unlikely to be experienced by people of certain ages. If a participant responded more than once that they had experienced a stressor that was very unlikely or impossible given their age, then that participant’s data for the RLCQ

were excluded from analyses. The “impossible” responses were when: (1) a participant who was 24 years old or younger indicated that they had experienced the birth of a grandchild, (2) a participant under 25 indicated that they had retired, (3) a participant under 24 indicated they had a child leave home to attend college, or (4) a participant under 24 indicated they had a child leave home to get married. The data from ten participants (nine of whom were women) were excluded based on this criterion.

In addition to these two criteria for exclusion, a scale score was not calculated for participants who did not answer all of the items for a given scale. The resulting numbers of scores remaining available for analyses are summarized in Table 1.5, which presents the number of valid responses, means, and standard deviations of the variables obtained in Study 2.

Table 1.5. Descriptive Statistics of All Study 2 Variables. There were a total of 272 in Study 2.

Variable	Study 2		
	N	Mean	S.D.
ARI	256	154.49	16.17
STAT-M Analytic	248	6.16	2.64
STAT-M Practical	168	6.54	2.25
STAT-M Creative	248	5.69	2.45
SMI	181	138.82	36.88
RLCQ	130	556.36	297.80
MCSD	156	14.49	7.16
Extroversion	246	31.98	3.22
Neuroticism	244	27.43	3.93
Agreeable	245	25.29	3.43
Conscientious	244	29.20	3.66
Openness	245	30.30	3.85
Cumulative GPA	260	2.66	0.77
Past GPA	221	2.73	0.72
Present GPA	260	2.69	0.73

Table 1.5. -- *Continued*

Math and Science GPA	259	2.39	0.96
Business and Humanities GPA	246	2.92	0.73
High School Rank	174	0.31	0.22
SAT Math	181	509.94	76.24
SAT Verbal	181	497.57	82.20
SAT Composite	181	1007.51	137.46
ACT Math	79	18.70	3.16
ACT English	79	19.27	3.89
ACT Composite	79	19.87	3.04
Transferred Hours	26	17.91	31.07
Economic Status	230	1.67	1.13
Age	267	21.30	5.22

3.4.2 Descriptive Statistics and Validities

Table 1.5 summarizes the number of participants, means, and standard deviations for the variables in Study 2. There were 272 participants in Study 2 (of which 185 were women and 87 were men). Their mean age was 21.30 ± 5.22 years.

A correlation matrix of the variables is provided in Appendix N, along with the correlations' associated significance levels. Note that in this matrix, 27 variables yield 351 unique comparisons. Of these 351 comparisons, 50 (14%) were significant at $\alpha = .001$, and an additional 54 (15%) were significant at $\alpha = .05$. Caution must be used when interpreting so many comparisons.

3.4.3 ARI Item Analysis

Table 1.3 lists the means, standard deviations, and unstandardized item-total correlations of the responding to each item of the ARI. The data presented are for the 256 participants who responded to all 40 items. The ARI data from four participants who did not respond to all of the items were excluded from the analyses.

The Cronbach's alpha for the ARI dropped from .89 in Study 1 to .59 in Study 2. The variance for the ARI scores in Study 1 (S.D. = 21.94) was much greater than the combined variances for the ARI scores in Study 2 (S.D. = 16.15), $F_{268, 244} = 1.78$, $p \ll .05$, so range restriction is responsible for at least some of the attenuation.

3.4.4 Predictive Validity of the ARI

Hierarchical multiple regression analyses were conducted to determine if ARI scores made a significant, unique contribution to the prediction of academic success. The core analysis was the same for all criteria: a comparison model without ARI scores

was compared to an exploratory model with ARI scores added. The terms included in the comparison model were: (a) the STAT-M, (b) the Big Five scale, (c) the MCSD, and (d) the SMI. The exploratory model contained all of these terms plus the ARI. If the exploratory model (which included the ARI) was significant, then the R^2 for the comparison model was compared to the R^2 of the exploratory model. A significant increase in the R^2 between these models supports the predictive validity of the ARI regarding the given criterion. Table 1.6 summarizes the R^2 , F -scores, and beta weights for the various regression models assessing the ARI's predictive validity. Appendix O details the R^2 s, N s, and beta weights for each step of the hierarchical models.

Table 1.6. Summary of Results from Linear Regressions Assessing the ARI's Predictive Validity. The F-score, k, and N are for the test if the R² for model containing an ARI term was significantly larger than the R² 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	β Weights													
						STAT-M		Big Five							
		<i>R</i> ²	<i>F</i>	<i>k</i>	<i>N</i>	Anal.	Pract.	Creat.	Extr.	Agree.	Neur.	Cons.	Open.	SMI	MCSD
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	-

Table 1.6. -- *Continued*

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	-
Past GPA	.25	1.83	11	105	.29	.05	-.14	.09	.34	.03	-.14	-.18	-.11	.02	.20
	.23	-	10	104	.31	.09	-.12	.15	.30	.02	-.16	-.19	.05	.08	-
Science GPA	.21	6.15	11	112	.25	.06	-.08	-.04	.30	.01	-.10	-.18	-.13	-.05	.26
	.16	-	10	114	.27	.09	-.03	.06	.27	.02	-.11	-.15	.02	.06	-
Hum. GPA	.17	4.16	10	107	.22	.11	-.04	.05	.28	.01	-.01	-.07	-	.04	.22
	.14	-	9	108	.19	.10	-.01	.04	.24	.02	-.04	-.10	-	.12	-
SAT Comp	.62	< 1	11	64	.24	.01	.57	-.07	.02	-.14	.03	-.20	-.14	-.13	.06
	.61	-	10	65	.25	.02	.59	-.06	.01	-.15	.03	-.22	-.10	-.12	-

Table 1.6. -- *Continued*

ACT Comp	.59	< 1	11	33	.26	.13	.27	.15	-.20	-.20	-.36	-.24	-.12	.09	.03
	.59	-	10	33	.26	.14	.28	.15	-.20	-.21	-.36	-.23	-.09	.09	-
HS Rank	.17	< 1	11	59	-.11	.22	-.07	.21	-.28	-.09	.07	-.02	.18	-.24	-.11
	.15	-	10	60	-.11	.20	-.09	.17	-.25	-.10	.02	-.12	.11	-.23	-

3.4.4.1 Prediction of GPA

Given the large number of abbreviations used in describing the results, Appendix P contains a glossary of the terms described herein. 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 ($\beta = .24$, $r_{\text{ARI and cum. GPA}} = .05$) 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 ($F_{1,100} = 5.64$, $p < .05$).

GPA was also analyzed predictively (as present GPA: GPA for the semester in which data were collected) and postdictively (as past GPA: GPA before semester in which data were collected). When predicting present GPA, the ARI beta weight ($\beta = .23$, $r_{\text{ARI and present GPA}} = .04$) was significant ($t_1 = 2.03$, $SE = 0.00$, $p < .05$). The R^2 of the model which included the ARI term ($R^2 = .22$) was significantly higher than the R^2 of the comparison model ($R^2 = .18$) predicting present GPA ($F_{1,101} = 5.26$, $p < .05$). ARI scores did not, however, significantly contribute to the postdiction of GPA before the data-collection semester ($\beta = .20$, $r_{\text{ARI and past GPA}} = -.02$, $R^2_{\text{Model with ARI}} = .25$, $R^2_{\text{Model without ARI}} = .23$, $F_{1,85} = 1.83$, n.s.).

The cumulative GPA was alternatively divided into cumulative GPA for math and science classes and cumulative GPA for business and humanities classes. The mean GPA for math and science classes (2.59 ± 0.96) was significantly larger than the mean GPA for business and humanities classes (2.46 ± 0.73), $t_{481.15} = 7.03$, $p < .05$. For

math and science classes, adding ARI scores to a model that otherwise contained all terms (i.e., the STAT-M, Big Five, MCSD, and SMI) significantly improved the prediction of cumulative GPA ($\beta = .26$, $r_{\text{ARI and science GPA}} = .04$, $R^2_{\text{Model with ARI}} = .21$, $R^2_{\text{Model without ARI}} = .16$, $F_{1,103} = 6.65$, $p < .05$). For business and humanities classes, the picture was not as simple. There was not a significant increase in the R^2 after adding the ARI to a model that contained all other terms (i.e., the STAT-M, Big Five, MCSD, and SMI), $R^2_{\text{Model with ARI}} = .16$, $R^2_{\text{Model without ARI}} = .15$, $F_{1,93} = 1.39$, n.s. However, removing the SMI from the model (leaving the STAT-M, Big Five, and MCSD in the comparison model) restored the ARI effect ($\beta = .22$, $r_{\text{ARI and hum. GPA}} = .06$, $R^2_{\text{Model with ARI}} = .17$, $R^2_{\text{Comparison Model without ARI}} = .14$, $F_{1,96} = 4.16$, $p < .05$).

3.4.4.2 Interactions between the ARI and SMI and between the ARI and MCSD

Although SMI and ARI scores were significantly correlated ($r = .46$, $p < .05$), as were MCSD and ARI scores ($r = .27$, $p < .05$), in none of the above linear regression models did a SMI x ARI interaction term or a MCSD x ARI interaction term result in a significant increase in the model R^2 . For tests of the SMI x ARI interaction term, all F s < 1 . For tests of the MCSD x ARI interaction terms, the largest $F_{1, 117} = 2.56$, n.s.

3.4.4.3 Other criteria

ARI scores also did not significantly contribute to models whose criteria were SAT composite scores ($\beta = .06$, $r_{\text{ARI and SAT comp}} = -.05$, $R^2_{\text{Model with ARI}} = .62$, $R^2_{\text{Model without ARI}} = .61$, $F_{1,52} < 1$, n.s.) or ACT composite scores ($\beta = .03$, $r_{\text{ARI and AT comp}} = -.11$, $R^2_{\text{Model with ARI}} = .59$, $R^2_{\text{Model without ARI}} = .59$, $F_{1,21} < 1$, n.s.). The overall model predicting high school rank with all predictors entered, including the ARI, was not significant ($\beta = -.11$,

$r_{\text{ARI and HS rank}} = -.13$, $F_{11, 58} < 1$, $\text{MSE} = 0.05$, n.s.), so any contribution made by the ARI would be moot.

3.4.4.3.1 Openness

The proportion of classes taken outside of one's major were not calculated for the 73 students whose majors were undeclared. In addition, no information was available about the major of one student. The mean proportion of classes taken outside of one's major for the 198 students for whom proportions could be calculated was $.72 \pm .30$. Proportion of classes taken outside of one's major and Openness scores were not significantly correlated ($r = .08$). In addition, the proportion was not significantly correlated with present GPA ($r = .04$) or with cumulative GPA ($r = .04$).

3.4.4.3.2 Major

A final area of exploration is in the effect of major. It is possible that different majors require different amounts of academic resilience, i.e., that resilience is better able to help the study of some subjects than other subjects. There were too many majors represented in the sample to allow meaningful analyses on major, so the school (i.e., of architecture, business, education, engineering, liberal arts, science, social work, and those who were undecided on a major and thus school) within the university was used instead. An ANOVA including STAT-M, Big Five, SMI, MCSD, RLCQ, ARI and school. The overall model was significant ($F_{26, 73} = 1.73$, $\text{MSE} = .406$, $p < .05$), but the school and school x ARI score interaction terms were not significant (school: $F_{7, 73} = 1.75$, interaction: $F_{7, 73} = 1.12$, both n.s.).

Table 1.7. 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.

Criterion	Model	β Weights												
						ARI x		ARI		Ethnicity				MSCD
		R^2	F	df_1	df_2	ARI	RLCQ	RLCQ	ES	x ES	Asian	Black	Hisp	
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
SAT Comp	.21	2.34	6	60	.00	-	-	.22	-.04	-.15	-.12	-.01	.00	.03
ACT Comp	.37	2.16	6	29	.06	-	-	.20	-.04	-.18	-.16	-.14	.00	-.10

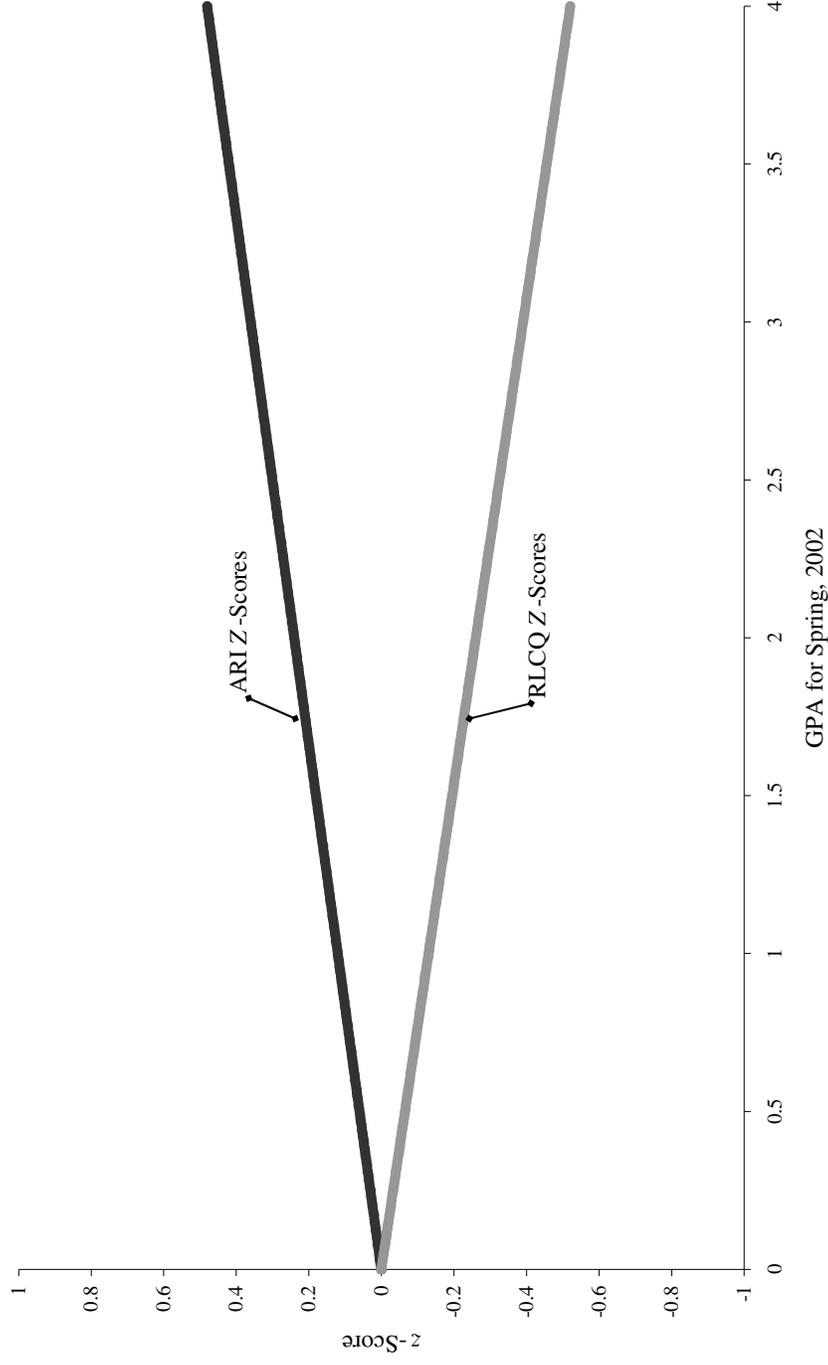
Table 1.7. -- *Continued*

HS Rank	.21	2.14	6	54	-.14	-	-	.02	-.19	-.12	.19	-.21	.00	-.05
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Figure 1.1

Comparison of ARI and RLCQ Regression Lines as Functions of the Spring, 2002 Semester GPA

Figure 3.: Estimated ARI and RLCQ z-Scores as Functions of GPA for the Spring, 2002 Semester



3.4.5 Construct Validity of the ARI

The relation between the ARI and stress and life barriers was analyzed in a linear regression model with GPA for the past year as the criterion and the ARI, RLCQ, MCSD, ethnicity, and economic status (ES) as regressors. The results of these analyses on the ARI and barriers, along with the beta weights for the terms, are presented in Table 1.7.

The overall model R^2 was .19. ARI scores ($\beta = .25$, $t_1 = 2.54$, $SE = 1.61$, $p < .05$) and the ARI x RLCQ interaction ($\beta = -.20$, $t_1 = 2.02$, $SE = 1.28$, $p < .05$) were both significant. The RLCQ term just missed significance ($\beta = .19$, $t_1 = 1.86$, $SE = 1.18$, $p < .07$). Power analysis (where $\alpha = .05$ and $1 - \beta = .95$) indicated that this term would reach significance when the sample size included 421 participants. The ARI x ES interaction, ethnicity, and the MCSD were not significant ($F_s \leq 1.41$). The interaction between ARI and RLCQ z -scores estimated from present GPA is depicted in Figure 1.1. The correlations between ARI and RLCQ scores ($r = -.00$) and between ARI scores and ES ($r = .06$) were both not significant (both Fisher's $z_s \leq 0.06$).

The other criteria tested were cumulative GPA, SAT composite scores, ACT composite scores, and high school rank. In all four of these models, the predictors were the ARI, ethnicity, ES, and MCSD. With cumulative GPA as the criterion, the overall model R^2 was .15, and the ARI ($\beta = .17$, $t_1 = 1.95$, $SE = 1.33$, $p < .05$) and economic status ($\beta = .21$, $t_1 = 2.18$, $SE = 1.50$, $p < .05$) parameters were significant. Ethnicity and MCSD scores were not significant ($t_s \leq 1.19$).

When predicting SAT composite scores, only economic status was significant ($t_1 = 2.21$, $SE = 328.24$, $p < .05$, all other $ts < 1$). Both of the overall models predicting ACT composite scores and high school rank were not significant ($ts \leq 1.47$).

3.5 Discussion

3.5.1 ARI Instrument Properties

Range restriction lowered the reliability of the ARI in Study 2. Because alpha represents the upper limit of a scale's validity (Nunnally and Bernstein, 1994), the performance of the ARI may be underestimated in Study 2.

Given the stability of resilience in longitudinal studies (e.g., Werner and Smith, 1992), using reliability to infer test-retest consistency is not a priority in the current study. However, if the ARI is used in subsequent studies to assess the stability of academic resilience, I suggest ensuring a diverse sampling to allow Cronbach's alpha to be as close to .9 as possible.

3.5.2 Predictive Validity

Linear regression models containing STAT-M, Big Five, SMI, and MCSD scores--with and without ARI scores--were best able to predict GPA, i.e., recent (and present) college academic success. They were generally less able to predict SAT and ACT scores, i.e., academic performance right before college. They were unable to predict high school rank. One explanation for this pattern of results is that the predictors are best able to predict current behavior, and that their predictive ability decreases as they are temporally removed from the time of the academic performance. The data are unable to test this explanation directly because the constructs were

measured at least months after the academic performance that resulted in the SAT scores, ACT scores, and high school rank. In addition these three measures of academic performance might be based on qualitatively different behaviors.

The GPA for the present semester (the semester during which data were collected) provides an indication of how well the ARI can forecast academic success. The ARI was able to significantly contribute to this forecast. 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.

The ARI made a small but significant contribution to the prediction of cumulative GPA and to the GPA for the semester in which it was administered. The ARI was also able to contribute to the prediction of math and science grades beyond that made by the STAT-M, Big Five, MCSD, and SMI. The ARI was not able to reliably add to the prediction of grades in business and humanities classes until SMI scores were removed from the model. These results suggest that, for business and humanities classes, academic resilience and self-motivation are roughly synonymous. For math and science classes, however, one's grades can benefit from more than just motivation; other aspects of academic resilience (perhaps such things as supportive social and family relationships) matter.

The ARI correlated strongly with the SMI. Nonetheless, these two instruments performed differently in the models, and thus academic resilience--to the extent that it is measured by the ARI--would appear to include more than just motivation. In fact,

because the ARI generally performed better than the SMI, it may be that the non-motivational aspects of the ARI are the better predictors of academic success. The ARI also correlated with social desirability, and so it would appear advisable that both scales be administered together (so that social desirability can be factored out) until aspects of the ARI that measure social desirability can be isolated.

The correlation with MCSD scores may imply that the ARI is “contaminated” and weakened by the presence of social desirability. On the other hand, it may imply that social desirability is also an aspect of academic resilience. As shown in Table 1.6, the weight for the Agreeableness term was often the highest for all the Big Five traits, further suggesting that an amiable and cooperative disposition may be an underestimated ingredient in academic success.

The few analyses that could be conducted to investigate the possible cause of the effect of Openness on GPA yielded little insight. Proportion of classes taken outside of one’s major, a possible manifestation of Openness that could influence GPA, was not found to correlate significantly with Openness or with GPA. The courses one needs to take for a given major are rather extensive and prescribed at UTA. It is possible that the large number of prescribed classes students are required to take afforded too little room for the students to take additional classes they wanted to take.

3.5.3 Construct Validity

At $\alpha = .05$, RLCQ scores were almost significant, negative predictors of GPA for the semester in which data were collected. It would appear whatever academic resilience buffers participants from, it is more than just major life stressors.

Higher economic status was a reliable predictor of academic success when measured as Present GPA, cumulative GPA, and SAT composite scores. On the other hand, the ARI x ES interaction was not significant. The academic resilience manifested in the ARI does not appear to be in defense against low economic status.

Whatever aspect of academic resilience the ARI measures, its scores significantly predicted the primary criterion: present GPA. ARI scores also significantly interacted with RLCQ in that model. Figure 1.1 depicts this interaction, based on the linear regression calculated by the model containing both terms with present GPA as the criterion (the terms of which are summarized in Table 1.7). 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) best supports Werner et al.'s (Werner, 1984; Werner and Smith, 1992; 1982) hypothesis that resilience is unlearned in the sense that stressors appear largely not to affect resilience. In other words, experiencing more stressors does not make one more resilient, implying that one does not learn resilience from experiencing stressors.

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.

CHAPTER 4

GENERAL DISCUSSION

4.1 Overview

The ARI displayed sufficient reliability in a general university student population. Range restriction attenuated the reliability in a second study on a less diverse population. The ARI added unique information to the prediction of cumulative GPA made by a model that otherwise included cognitive ability and personality. In addition, the results indicate that the ARI measures one's ability to mediate the effects of major life stressors.

The ARI's contributions to the predictions of academic success were small, however. If academic resilience is an important contributor to academic success, then the ARI may under represent the impact of resilience on academics, and therefore the domain from which the ARI samples should be modified. The results of the assessments of the ARI's construct validity offer some guidelines about how to alter the sampled domain.

The influence of economic standing on academic success was expected (Gottfried, 1984; Pollitt, Gorman, Engle, Martorell, and Rivera, 1993; Ricciutti, 1993; Schoenthaler, Amos, Eysenck, Peritz, and Yudkin, 1991; White, 1982); the lesser influence of stressors was not expected (Cunningham, Hurley, Foney, and Hayes, 2002; Gonzales, Tein, Sandler, and Friedman, 2001; Nelson, Dell, Koch, and Buckler, 2001).

For different reasons, both are important for guiding future development of the ARI. Economic standing guides future development because it was found to be an important predictor of academic success, but was not strongly related to ARI scores. Therefore, an attempt should be made to modify the ARI by adding items that better measure one's ability to overcome a poor economic standing. Clark (1983) and Gandara (1982) argue that people who grew up in poverty use different skills to adapt and succeed than do those who grew up in more economically privileged homes. Individuals who grew up in poverty appeared to benefit more from parents who (a) have high expectations (Clark, 1983) and (b) require more responsible behavior (Baldwin, Baldwin, and Cole, 1990).

The role of stress is important because the ARI was able to mediate the relation between it and academic success. Therefore, while the ARI is being modified to attempt to measure better one's resilience against poor economic standing, attention should be taken not to interfere with the ARI's mediation of stress on academic success. In addition, future research should further investigate the role of stress on academics to more fully gauge the impact of stress.

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.

4.2 Possible Relationships between Academic Resilience and Other Constructs

Further investigations into the validity of the ARI--and resilience in general--may find that resilience is related to (or even subsumed under) well-studied constructs, such as an optimistic explanatory style, need for achievement, or even a high expectancy-value force of academic achievement or immunization against learned helplessness. Given the long-term stability researchers such as Werner and her colleagues (e.g., Werner and Smith, 1992) found resilience to have, I would expect trait constructs to be better candidates for explaining resilience than state constructs. Nonetheless, there are some conditions in which state constructs could account for at least academic resilience, and so will be explored briefly here.

4.2.1 *Explanatory Style*

An optimistic explanatory style may be an important aspect of academic resilience. Explanatory style--be it optimistic or pessimistic--describes to what a person tends to perceive are the sources of one's successes and failures (Peterson and Seligman, 1984). Explanatory style is partially heritable (Schulman, Keith, and Seligman, 1993) and relatively stable (Burns and Seligman, 1989; Nettles and Pleck, 1994; Nolen-Hoeksema, Girgus, and Seligman, 1986)--although it can be altered at least by cognitive therapy (Hollon, DeRubeis, and Seligman, 1992; Seligman, et al., 1988). Those with an optimistic explanatory style tend to attribute failures to unstable,

external, and specific (i.e., limited and controllable) sources; those with a pessimistic explanatory style tend to attribute them to stable, internal, uncontrollable sources. A pessimistic explanatory style leaves one with the impression that barriers are insurmountable, leaving one prone to respond to failure with passivity. In an academic environment, Peterson and Barrett (1987) found that this pessimism translates into going to one's academic advisor less often, which in turn contributed to poor grades. On the job, attributional pessimists have been found to be less productive and be more likely to quit than their optimistic peers (Seligman and Schulman, 1986). Explanatory style appears to be a more important factor for those who spend more time and energy trying to explain the sources of their successes and failures than those who don't do this (Haaga, et al., 1995), and there are times when a pessimistic explanatory style is warranted (Satterfield, and Seligman, 1994). Nonetheless, it appears that an optimistic explanatory style may be an important ingredient in resilience.

An optimistic explanatory style has been shown to protect students from depression (Gillham and Reivich, 1999; Gillham, Reivich, Jaycox, and Seligman, 1995; Jaycox, Reivich, Gillham, and Seligman, 1994; Shatte, Reivich, Gillham, and Seligman, 1999; but see Isaacowitz and Seligman, 2001), most importantly in an academic setting. Metalsky, Abramson, Seligman, Semmel, and Peterson, (1982) reported that students measured to have a pessimistic explanatory style early in the semester became more depressed when receiving a bad grade on the subsequent midterm. However, Satterfield, Monahan, and Seligman, (1997) found that attributional pessimists fared better in law school.

Along with its stability, the ways in which an optimistic explanatory style protects one from adverse events thus to improve one's chances of succeeding academically, sets it up to be a strong candidate as an explanation of academic resilience. Therefore, as resilience itself becomes more directly testable (be it via the ARI or however), I would suggest its relation to, e.g., Peterson, von Baeyer, Abramson, Metalsky, and Seligman's (1988) Attributional Style Questionnaire be studied.

4.2.2 Need for Achievement

Need for achievement motivates people to pursue "success in competition with a standard of excellence" (McClelland, Atkinson, Clark, and Lowell, 1953). Whereas an optimistic explanatory style appears to work largely by insulating one from becoming overwhelmed by adversity and failure, a high need for achievement motivates people to internalize both successes and failures (Weiner, 1980). Especially when the standards of excellence are as well-defined as they are in academia (viz., via GPA), people high in need for achievement choose tasks that are moderately difficult to difficult (Kuhl and Blankenship, 1979; Slade and Rush, 1991), show more and better effort on moderately-difficult tasks (Karabenick and Yousseff, 1968; Raynor and Entin, 1982), procrastinate little (Blankenship, 1987), and--most importantly here--persist in the face of difficulty and failure more than those low in need for achievement (Feather, 1961; 1963). It is possible, then, that resilient students are higher in need to achieve than less resilient peers.

Atkinson (1957; 1964) argued that one's need to achieve interacted with one's belief about the probability of success; one was most likely to engage in and persist

with a task when one's need for achievement and when the probability for success were both high. Given this, it would appear that a high need for achievement may not be sufficient to explain academic resilience--one would also need to believe he or she would succeed. A history of past success, of course, could provide this, and may account for the resilience of some lucky students who were able to realize early success beyond the predicted levels. An optimistic explanatory style could be another source of belief about success. Therefore, need for achievement may be a component of academic resilience (and resilience in general), but an optimistic explanatory style may be more fundamental to it.

4.2.3 Learned Helplessness

The lives of many of those studied in resiliency research seem custom-made to induce learned helplessness, originally conceived to be the learning that one's actions are unable to affect a change, especially against adverse stimuli (Seligman, 1975). Ensuing research in humans argued that an internal, stable, and uncontrollable attributions to the lack of success in changing the environment was important in establishing learned helplessness (Abramson, Seligman, and Teasdale, 1978; Peterson et al., 1993; Wortman and Brehm, 1975). One can become "immunized" against learned helplessness by having the subject experience brief periods of failure followed by success (Altmaier and Happ, 1985; Jones, Nation, and Massad, 1977; Seligman and Maier, 1967; Thornton and Powell, 1974), and by fostering an optimistic explanatory style (Ramirez, Maldonado, and Markus, 1992).

Resilient individuals may well include those who become immunized against learned helplessness, and--again--that have an optimistic explanatory style. In addition, mastery orientation--the converse of learned helplessness--motivates one to persevere in the face of difficulties and failures. Both, however, rely on a history of learned behaviors and explanatory style. In order to be a consistent, significant component of academic resilience (and assuming academic resilience is generally stable), the learned component either must occur early in one's academic career. This may indeed happen, and may differentiate the resilient from those who could have become resilient, but does require early academic success beyond that normally expected for that individual.

Immunization to learned helplessness and mastery orientation also require an optimistic explanatory style. Again, it appears that whatever other mechanisms affect one's academic resilience, explanatory style presents itself as a necessary and important component, and therefore may be among the best places to begin searching for the mechanisms of resilience.

4.2.4 Expectancy-Value Theory

Immunization against learned helplessness requires the interaction of experience with demeanor. In a somewhat similar way, expectancy-value theory argues that one's motivation to engage in (or withdraw from) a task depends both on the probability one has of succeeding and the value one places on succeeding (Eccles et al., 1983; Wigfield, 1994; Wigfield and Eccles, 2000). The expectancy, of course, results from previous experience (be it personal or vicarious), and is thus subject to the same criticism as the learned aspect of immunization against learned helplessness/mastery orientation: It

would require that those who are academically resilient experience an early, sustained period of unexpected success that establishes an expectancy and understanding that perpetuates continued success (i.e., the academically resilient are those who have been lucky enough to achieve unexpected success), and verges on becoming tautologous.

The value one attributes to academic success, and its influence on one's perseverance, however, merits further consideration. One's performance in math classes in elementary, middle, and high school maps the extent to which one values math (Eccles et al., 1983; Eccles and Wigfield, 1995; Wigfield, 1994). One would therefore expect that high academic achievers, including the academically resilient, would be those who also highly value academic success. Like an optimistic explanatory style, valuing academic success may be a necessary part of academic resilience.

4.3 General Resilience and Academic Resilience

Placing a high value on success and maintaining an optimistic explanatory style (and, possibly, an early history of unpredicted success which sets the stage for subsequent success) may be parts of more than just academic resilience: academic resilience may be one manifestation of general resilience. (As discussed earlier, Werner et al. (Werner, Bierman, and French, 1971; Werner and Smith, 1977, 1982, 1992) found their resilient subjects to have high self-esteem and an internal locus of control. The internal locus of control may have been part of a generally optimistic explanatory style—as may the high self-esteem.) Certainly the items used to construct the ARI were drawn from research on general resilience. In the absence of research explicitly investigating the relation between academic resilience and resilience in general, I argue

that academic resilience is one expression of general resilience. However, the stressors and barriers in academia *per se* are generally not as severe as those one may need to overcome in other aspects of life. In academia, generally the worst that can happen is expulsion, whereas outside of academia, one may be imprisoned, strapped by severe poverty, etc. Therefore, I would expect that academic resilience would require less extreme endurance and resolve to achieve than general resilience. Of course, as defined here, the academically resilient would need to overcome barriers like prejudice, economic hardship, etc.; this, however, does not negate what one needs to overcome and do within academia *per se* to succeed.

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, I 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. Ironically, the *Academic Resilience Inventory* may account for a larger portion of the variance of success outside of academia.

4.3 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, I 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).

APPENDIX A

THE ITEMS OF THE NCQ (TRACEY & SEDLACEK, 1984) AND THE NCQ-R
(TRACEY & SEDLACEK, 1989). NCQ ITEMS ARE IN BOLD FACED TYPE,
NCQ-R ITEMS ARE IN NORMAL FACED TYPE

I am sometimes looked up to by others.

If I ran into problems concerning school, I have someone who would listen to me and help me.

In groups where I am comfortable, I am often looked to as leader.

I want a chance to prove myself academically.

If course tutoring is made available on campus at no cost, I would attend regularly.

I expect I will encounter racism at the University of Maryland.

Once I start something, I finish it.

When I believe strongly in something, I act on it.

I am as skilled academically as the average applicant to the University of Maryland.

I expect to have a harder time than most students at the University of Maryland.

My family has always wanted me to go to college.

My friends and relatives do not feel I should go to college.

I get easily discouraged when I try to do something and it does not work.

People can pretty easily change me even though I thought my mind was already made up on the subject.

When I believe strongly in something, I act on it.

My high school grades do not reflect what I can do.

It should not be very hard to get a B (3.0) average at the University of Maryland.

I know the areas where I am weak and I try to improve them.

I try to find opportunities to learn new things.

I was a leader in high school.

My friends look at me to make decisions.

I am not good at getting others to go along with me.

I prefer to be spontaneous rather than to make plans.

I usually mark important dates on my calendar.

I know what I want to be doing 10 years from now.

I have studied things about my major field on my own.

I often make lists of things to do.

I have talked about my career goals with someone who has worked in that field.

I have already learned something in my proposed major outside of high school.

I expect to be involved in many off-campus activities while enrolled here.

I don't expect to get to know faculty personally during my first year.

I am comfortable interacting with people from other races or cultures.

I expect the faculty to treat me differently from the average student here.

I enjoy working with others.

I keep to myself pretty much.

I find I get more comfortable in a new place as soon as I make some good friends.

I expect to find lots of people who are like me here.

I expect to have little contact with student from other races.

My friends are exclusively the same race as I am.

My background should help me fit in well here.

I have learned more outside of school than in school.

APPENDIX B

THE CHARACTERISTICS OF RESILIENCE USED TO CREATE THE ITEMS ON THE RESILIENCE SCALE

- Apt to like and do well in school
- Uses an active problem solving approach that enables them to successfully handle emotionally hazardous experiences
- Has a tendency to perceive their experiences constructively, even if these experiences have caused pain and suffering
- Believes that they have at least some control of their fate
- Responds well to stress
- Believes in one's own effectiveness
- Has the capacity to cope with opportunities, challenges, frustration, threats in the environment
- Has the ability to act autonomously (are self-reliant)
- Elicits care-giving from non-parents if the parents couldn't give it
- "The capability for, or manifestation of, favorable adaptation." (Masten and Coatsworth, 1995, pg. 716)
- Shows a strong use of faith to maintain an optimistic attitude about life.
- Establishes strong social ties
- Displays "required helpfulness" – taking care of younger siblings or the household, working part-time to support their family, etc.
- Believes that life makes sense
- Establishes a close bond with at least one care giver from whom they receive lots of attention during the first year of life
- Received enough good nurturing to establish a basic sense of trust

- Maintains “internal integration”
- Has the ability to elicit help from others
- Displays temperamental characteristics that evoke positive responses from family members and strangers
- Seeks out novel situations
- Has a gainfully and steadily employed mother (especially important for young girls)
- Has a high level of motivation
- Has an accessible role model
- Tends to play vigorously
- Lacks fear
- Has a source of solace, like a hobby
- Has a "healthy androgyny" (Werner, 1984, pg.)
- Has a sense of humor
- Lives in a structured home and assigned chores
- Is well-liked by peers
- Has at least one close friend
- Is active in extra-curricular school activities (sports, drama, dance, sometimes all at the same time) or other organized after-school things (e.g., in younger people, YWCA, Boys' and Girls' Club, etc.)
- Uses school as a refuge

APPENDIX C

LETTER USED TO SOLICIT PARTICIPANTS FROM THE COUNSELING OFFICE
AND THE ACADEMIC ADVISING OFFICE

Dear Student,

This packet is a scale we would like you to complete if you have the time. The scale is part of a study that we hope will help us better serve UTA's students in the future. You do not have to complete it and your responses will be kept strictly confidential.

Completing it will not affect how long it takes for you to see a counselor or any other personnel. You may complete it before or after you see a counselor, but we ask that you complete it here.

Thank you,

El Samuels

Department of Psychology

LS 519

(817) 272-5243

APPENDIX D

LETTER USED TO SOLICIT PARTICIPANTS FROM THE COUNSELING OFFICE
AND THE ACADEMIC ADVISING OFFICE VIA THE SECURE WEBSITE

Dear Student,

Could you spare less than half an hour?

Prof. Ira Bernstein and Mr. El Samuels are studying how to help students do better on college. Part of this study is an online survey at <https://www2.uta.edu/resiliency> that asks questions about your attitudes towards yourself, others, and life in general. If you would please take about 10 minutes to complete this survey, you would help us in our pursuit to find ways to keep disadvantaged students in school and to obtain higher grades.

The website is secure, and your responses to the survey are encrypted. To enter the site, you must enter your UTA NT username and password (i.e., the username and password you would use to access a PC in, e.g., Ransom Hall). The default value for your username is FMLSSSS where "F" is the first letters of your first name, "M" is either the first letter of your middle name (or an "x" if you don't have a middle name), "L" the first letter of your last name, and "SSSS" the last four digits of your student ID number. The default value for your password is MMDDYYNN where "MM" is the two digit month, "DD" the two digit day, and "YY" the two digit year of your birth; "NN" is the first two digits of your student ID number. If you've changed your password and forget what it is, you can reset it at <https://eservices.uta.edu/resetpassword>. After you've reset it, you can change it to something else again at <https://www2.uta.edu/iisadmpwd/aexp2b.htr>.

Further information about the survey is available at the website. Feel free also to contact either (or both) Prof. Bernstein or El Samuels with any questions or concerns you may have. The office for Prof. Ira H. Bernstein, a UTA Psychology Professor, is in room 307 LS. He may be reached by voice phone at (817) 272-3183 or electronically as Bernstein@uta.edu. The co-investigator is Mr. William E. Samuels, a UTA graduate student. His office is in room 519 LS. He may be reached by voice phone at (817) 272-5243 or electronically as Samuels@uta.edu. Their address is Department of Psychology, Box 19528, Arlington, TX 76019-0528 and their fax number is (817) 272-2364.

This research study has been reviewed and approved by The University of Texas at Arlington Human Research Review Committee. If you have questions about your rights as a research subject or about a research related injury, you may contact a representative of the committee by calling 817-272-2105.

We hope you have the time to give us a hand.

Thank you,

Ira Bernstein, Ph.D.

El Samuels, M.S.

APPENDIX E

INFORMED CONSENT USED IN STUDY 1

Normative Responses to a Non-Academic Measure of Academic Success.

This is a study designed to improve the prediction of academic success. You are not obligated in any way to participate in this study. Participation is completely voluntary, and you may withdraw your consent at any time. The investigators will keep all information strictly confidential so the individual data you furnish will not be known by anyone besides them. All data made public will be released in the form of composites (averages). We expect to run several hundred participants.

We are asking two things of you. First, we are asking that you complete a 50-question survey form now. If you would like, you may look over the form before you decide whether or not to volunteer. Second, we are asking that you give us permission to access your records in order to obtain the data you furnished for purposes of admission, such as your SAT and high school grade point average (GPA), and your course grades, which include the grades you previously earned either here or at other universities, and those you will obtain in the next long semester.

We will be statistically correlating your admissions data and our survey data to see if the survey data adds to what your admissions data can predict. In other words, we are attempting to validate the survey's predictive ability. If the survey helps our predictions, it may be used to improve our ability to assist students succeed in college.

There are no anticipated ill effects of participation in the study. In the event you are injured in the course of completing the form, you may go to the UTA Health Service Center and be treated in the usual way providing you are a student currently registered at UTA. Otherwise, you may be covered under optional medical insurance that you carry. UTA does not offer any other compensation for injury.

Some of the benefits you may gain from this study are a deeper understanding of institutional research, and the experience of possibly helping advance scientific knowledge. This study is under the direction of Prof. Ira H. Bernstein, a UTA Psychology Professor. His office is in room 307 LS. He may be reached by voice phone at (817) 272-3183 or electronically as Bernstein@uta.edu. The co-investigator is Mr. William E. Samuels, a UTA graduate student. His office is in room 519 LS. He may be reached by voice phone at (817) 272-5243 or electronically as Samuels@uta.edu. Their mail address is Department of Psychology, Box 19528, Arlington, TX 76019-0528 and their fax number is (817) 272-2364. Feel free to contact either or both with any questions or concerns you may have. When the experiment is completed, they will provide a summary of the results upon request.

This research study has been reviewed and approved by The University of Texas at Arlington Human Research Review Committee. If you have questions about your rights as a research subject or about a research related injury, you may contact a representative of the committee by calling 817-272-2105.

This signed consent form has been provided to the subject as a duplicate original.

I have had a chance to ask and have had answered all questions concerning this study. I am at least 18 years of age, consent to participate in this study, and understand the above information.

_____ / _____ / _____

Signature of Student

Social Security Number

Date

Ira H. Bernstein

William E. Samuels

APPENDIX F

THE DEBRIEFING STATEMENT ATTACHED TO THE PAPER VERSION OF
THE SCALE ADMINISTERED AT THE COUNSELING AND ACADEMIC
ADVISING OFFICES AND IN STUDY 1

Further Explanation of the
*Normative Responses to a Non-Academic
Measure of Academic Success Study*

We are designing a scale that will measure and predict how well students do in college. Usually, people use some sort of intelligence test to predict how well someone will do in school. But, of course, it takes more than just intelligence to succeed in school. So, we are attempting to study the non-intellective things that help people succeed in school.

Most of the ideas about how to create this scale came from research into “resiliency.” The first selected further reading at the bottom of this page is a review of this research. In general, resilient people are ones who are able to overcome great adversity and “beat the odds” to succeed in school, careers, etc. We are trying to learn from these resilient people how to succeed.

We are actually interested in success in general. We have decided to concentrate academic success because education is itself not only a measure of success, but also often a gateway to further success. Of course, in order to see if our scale can predict academic success, we must see what kinds of grades the people taking the scale got so we can know how accurate our predictions were. Be assured that we will let *no one* see your grades, scale scores, etc. All of the information we obtain is kept strictly confidential. We ourselves won’t even be looking at people individually anyway, so even we won’t look at how you do as an individual.

Designing such a scale is like designing a machine. First one starts with a general idea of what job they want the machine to do, and generally how the machine will do it. Then, a prototype machine is built and tested to see how well it works. Depending how the prototype works, the design will be modified until the machine is working like it should. Finally, the machine can be put into general use. The version of the scale you took is the prototype version. We will pool the results of the hundreds of people taking this scale to see how we must refine the scale to more precisely measure academic success. Through this process, the scale should become both shorter and more focused.

Once this scale has been honed and validated to indeed measure academic success, it can be used for at least two purposes. First, scores on the scale should help college counselors better address their students' needs. Second, it should help scientists study how to help otherwise disadvantaged people succeed. Your participation will help us help others to succeed. Thank you.

Selected Further Reading

Garnezy, N. (1983). Stressors of childhood. In N. Garnezy and M. Rutter (Eds.), *Stress, coping, and development in children*. New York: McGraw-Hill, 43-84.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd Ed.). New York: McGraw-Hill.

APPENDIX G

COVER LETTER ON THE FIRST PAGE OF THE ONLINE VERSION
OF THE SCALE

Resiliency Survey

Dear Student,

Thank you for visiting. This site contains an on-line version of a survey being developed to improve student's chances of succeeding in higher education. By completing the survey found on this site, you will help us to create a valid and reliable scale.

There are two sections to this site. The first section, the informed consent section, explains the survey in more detail, so you know what you're getting into. After reading the informed consent section, enter your name and UTA student ID number to indicate that you have read, understood, and agree with the informed consent section. This is a secure site, so your information is safe. You must enter both your name and student ID number in order to complete the survey.

The second section of this site is the survey itself. Please fill in all the fields. When you are done, hit the "Submit" button. You will see a Confirmation Page when your survey has been entered. You may wish to print out this confirmation page for your records.

Thanks again,

El Samuels, M.S.

Ira Bernstein, Ph.D.

The Department of Psychology

The University of Texas at Arlington

APPENDIX H

LETTER OF CONSENT AS FOUND ON THE FIRST PAGE OF THE ONLINE
VERSION OF THE SCALE

Informed Consent

Please read the following section and then enter your name and student ID number to indicate that you have read and understood the informed consent section.

This is a study designed to improve the prediction of academic success. You are not obligated in any way to participate in this study. Participation is completely voluntary, and you may withdraw your consent at any time. The investigators will keep all information strictly confidential so the individual data you furnish will not be known by anyone besides them. All data made public will be released in the form of composites (averages). We expect to run several hundred participants.

We are asking two things of you. First, we are asking that you complete the 50-question survey below. If you would like, you may look over the form before you decide whether or not to volunteer. Second, we are asking that you give us permission to access your records in order to obtain the data you furnished for purposes of admission, such as your SAT and high school grade point average (GPA), and your course grades, which include the grades you previously earned either here or at other universities, and those you will obtain in the next long semester.

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attempting to validate the survey's predictive ability. If the survey helps our predictions, it may be used to improve our ability to assist students succeed in college.

There are no anticipated ill effects of participation in the study. In the event you are injured in the course of completing the form, you may go to the UTA Health Service Center and be treated in the usual way providing you are a student currently registered at UTA. Otherwise, you may be covered under optional medical insurance that you carry. UTA does not offer any other compensation for injury.

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This research study has been reviewed and approved by The University of Texas at Arlington Human Research Review Committee. If you have questions about your rights as a research subject or about a research related injury, you may contact a representative of the committee by calling 817-272-2105.

This signed consent form has been provided to the subject as a duplicate original.

I have had a chance to ask and have had answered all questions concerning this study. I am at least 18 years of age, consent to participate in this study, and understand the above information.

[Box to enter first name] First Name [Box to enter middle initial] Middle Initial [Box to enter last name] Last Name

[Box to enter first three digits of student ID number (SIDN)] - [Box to enter second two letters of SIDN] - [Box to enter last four digits of SIDN] Student ID Number

Please enter your name and student ID number to indicate that you have read, understand, and agree with the informed consent section.

APPENDIX I

CONFIRMATION PAGE OF THE ONLINE VERSION

Dear [Box containing student's first name] [Box containing student's middle initial]
[Box containing student's last name],

Thank you for completing the resiliency survey. You may want to print out this confirmation page because it is like a receipt that you completed the survey. This page also contains a more detailed explanation of the purpose and background of the survey.

If you have any further questions or comments, please feel free to contact either El Samuels or Prof. Ira Bernstein. El Samuels' office is in Life Science room 519, his phone number is (817) 272-5243, and his email address is Samuels@uta.edu. Prof. Bernstein's office is in Life Science room 307, his office phone number is (817) 272-3183, and his email address is Bernstein@uta.edu. Their fax number is (817) 272-2364.

Sincerely,

El Samuels and Prof. Ira Bernstein
The University of Texas at Arlington
The Department of Psychology

*You may return to the feedback form by using the **Back** button in your browser.*

This copy of the informed consent section along with your name and student ID number below are your receipt for completing the scale. It also contains the contact information for the investigators should you want to contact them. Therefore, you may want to print this page for your records.

Copy of Informed Consent

This is a study designed to improve the prediction of academic success. You are not obligated in any way to participate in this study. Participation is completely voluntary, and you may withdraw your consent at any time. The investigators will keep all information strictly confidential so the individual data you furnish will not be known by anyone besides them. All data made public will be released in the form of composites (averages). We expect to run several hundred participants.

We are asking two things of you. First, we are asking that you complete the 50-question survey below. If you would like, you may look over the form before you decide whether or not to volunteer. Second, we are asking that you give us permission to access your records in order to obtain the data you furnished for purposes of admission, such as your SAT and high school grade point average (GPA), and your course grades, which include the grades you previously earned either here or at other universities, and those you will obtain in the next long semester.

We will be statistically correlating your admissions data and our survey data to see if the survey data adds to what your admissions data can predict. In other words, we are attempting to validate the survey's predictive ability. If the survey helps our predictions, it may be used to improve our ability to assist students succeed in college.

There are no anticipated ill effects of participation in the study. In the event you are injured in the course of completing the form, you may go to the UTA Health Service Center and be treated in the usual way providing you are a student currently registered at UTA. Otherwise, you may be covered under optional medical insurance that you carry. UTA does not offer any other compensation for injury.

Some of the benefits you may gain from this study are a deeper understanding of institutional research, and the experience of possibly helping advance scientific knowledge. This study is under the direction of Prof. Ira H. Bernstein, a UTA Psychology Professor. His office is in room 307 LS. He may be reached by voice phone at (817) 272-3183 or electronically as Bernstein@uta.edu. The co-investigator is Mr. William E. Samuels, a UTA graduate student. His office is in room 519 LS. He may be reached by voice phone at (817) 272-5243 or electronically as Samuels@uta.edu. Their mail address is Department of Psychology, Box 19528, Arlington, TX 76019-0528 and their fax number is (817) 272-2364. Feel free to contact either or both with any questions or concerns you may have. When the study is completed, they will provide a summary of the results upon request.

This research study has been reviewed and approved by The University of Texas at Arlington Human Research Review Committee. If you have questions about your rights as a research subject or about a research related injury, you may contact a representative of the committee by calling 817-272-2105.

This signed consent form has been provided to the subject as a duplicate original.

I have had a chance to ask and have had answered all questions concerning this study. I am at least 18 years of age, consent to participate in this study, and understand the above information.

Please enter your name and student ID number to indicate that you have read, understand, and agree with the informed consent section.

Further Explanation of the Study

We are designing a scale that will measure and predict how well students do in college. Usually, people use some sort of intelligence test to predict how well someone will do in school. But, of course, it takes more than just intelligence to succeed in school. So, we are attempting to study the non-intellective things that help people succeed in school.

Most of the ideas about how to create this scale came from research into "resiliency." The first selected further reading at the bottom of this page is a review of this research. In general, resilient people are ones who are able to overcome great adversity and "beat the odds" to succeed in school, careers, etc. We are trying to learn from these resilient people how to succeed. We are actually interested in success in general. We have decided to concentrate academic success because education is itself not only a measure of success, but also often a gateway to further success. Of course, in order to see if our scale can predict academic success, we must see what kinds of grades the people taking the scale got so we can know how accurate our predictions were. Be assured that we will let no one see your grades, scale scores, etc. All of the information we obtain is kept strictly confidential. We ourselves won't even be looking at people individually anyway, so even we won't look at how you do as an individual.

Designing such a scale is like designing a machine. First one starts with a general idea of what job they want the machine to do, and generally how the machine will do it. Then, a prototype machine is built and tested to see how well it works. Depending how the prototype works, the design will be modified until the machine is working like it should. Finally, the machine can be put into general use. The version of the scale you took is the prototype version. We will pool the results of the hundreds of people taking this scale to see how we must refine the scale to more precisely measure academic success. Through this process, the scale should become both shorter and more focused.

Once this scale has been honed and validated to indeed measure academic success, it can be used for at least two purposes. First, scores on the scale should help college counselors better address their students' needs. Second, it should help scientists study how to help otherwise disadvantaged people succeed. Your participation will help us help others to succeed. Thank you.

Selected Further Reading

Garmezy, N. (1983). Stressors of childhood. In N. Garmezy and M. Rutter (Eds.), *Stress, coping, and development in children*. New York: McGraw-Hill, pp. 43-84.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd Ed.). New York: McGraw-Hill.

*You may return to the survey by using the **Back** button in your browser.*

APPENDIX J

THE ARI (AND ADDITIONAL ITEMS) AS PRESENTED IN STUDY 2

Instructions: Please record all of your answers on the answer sheet paper clipped to these instruments. Please fill in your name and student ID on this answer sheet as well. Please read each of the numbered sentences below then indicate how much you agree or disagree with the given statement by filling in one response for each question on your answer sheet based on the following scale:

- a.) Strongly agree
- b.) Agree
- c.) Neither agree nor disagree
- d.) Disagree
- e.) Strongly disagree

Thank you for your cooperation!

1. I get excited when new opportunities arise.
2. I have at least one very close friend.
3. When I need help, there never seems to be anyone around.
4. There's a lesson to be learned from every situation.
5. Most of the problems in my life are too big to be solved.
6. I don't like trying new things.
7. I usually look at the bright side of things.
8. I usually learn from my mistakes.
9. Other people tend to rely on me to get things done.
10. I don't like taking on new responsibilities.

11. If I really want to do something, I can do it.
12. I like solving problems.
13. I would make a good parent.
14. I can easily find people to help me when I need it.
15. There is no one in my life who takes good care of me.
16. There is no situation I could not overcome.
17. I can usually take care of myself.
18. I often don't think that I deserve to succeed.
19. Even though stuff can go wrong, things usually work out in the end.
20. I have high expectations for myself.
21. I'm not the parental type.
22. I look at problems as challenges to be overcome, not things to avoid.
23. I don't like myself.
24. Everything works out all right in the end.
25. I can adapt easily to new situations.
26. I find it hard to make new friends.
27. Things are never as bad as they seem.
28. I am not happy in my current/latest romantic relationship
29. I enjoy my job.
30. I have gotten as much formal education as I had hoped I would.
31. I am respected and admired at work.
32. I do my job better than most people who have the same job as I.

33. I gain comfort from my religious faith.
34. I have been successful in my career.
35. I can overcome any obstacle.
36. I have been successful in most areas of my life.
37. I have always been motivated to do well in school.
38. I set high goals for myself that I plan to reach.
39. I am a survivor.
40. Things usually work out for me in the end.

***Instructions:* Please respond to the following questions, and then move on to the next part.**

41. What is the total, yearly income of your household. In other words, what is the total pool of yearly income from which you and those living in your home draw.
 - a. \$5,000 or less
 - b. \$5,001 to \$15,000
 - c. \$15,001 to \$30,000
 - d. \$30,001 to \$40,000
 - e. \$40,001 to \$50,000
 - f. \$50,001 to \$60,000
 - g. \$60,001 to \$70,000
 - h. \$70,001 to \$80,000

i. \$80,001 to \$90,000

j. \$100,000 or more

42. How many people are living in your home. In other words, how many people are supported by the income you indicated in item 42?

a. 1 f. 6

b. 2 g. 7

c. 3 h. 8

d. 4 i. 9

e. 5 j. 10

APPENDIX K

INFORMED CONSENT USED IN STUDY 2

Research Title: Validation of a Scale Designed as a Non-Academic Measure of Academic Success.

I understand that the questions in the accompanying opinion survey are designed to be potential indicators of academic success in college. The questions will ask about my attitudes and views about myself, my perspective on life, and to solve word and math problems. I understand that I was asked to participate in this study because students at the University of Texas at Arlington are considered not to differ from college students across the nation, thus UTA students can be used to represent how American college students in general might respond in this study.

The purpose of this study is to develop a scale that will predict academic success without actually measuring how well one does in school. While one's current and past levels of academic success are good predictors of future academic success, they do not perfectly predict how well one will do in school. Therefore, it appears that other factors contribute to how well someone does in school. This survey is one step in developing such a scale to measure some of the other, non-academic factors that may contribute to academic success. Your responses to the questions will be used to help determine how to modify and improve this scale to predict academic success.

Because the experimenters wish to investigate how well the questions in the accompanying opinion survey predict academic success, I also agree to allow the

experimenters to access my SAT and current cumulative GPA at the University of Texas at Arlington. The only information that will be obtained about me is my responses to the questions below, my SAT scores, and my current cumulative GPA at UTA. No other information will be obtained about me. In addition, the experimenters will access my SAT and GPA only once and only during the current semester. I understand that they will access these scores using my student ID number, and at no time will the experimenters associate the scores with my name. I further understand that the data gathered about me in this study will be kept strictly confidential; the experimenters will keep my responses to the questions in this study and my scores on the SAT and current cumulative UTA GPA confidential and anonymous.

I expect the only discomfort I will experience during this study is perhaps feeling somewhat bored. I understand that if I experience any injury from participation in this interview that I may obtain medical assistance from the UTA Student Health Services building at 605 S. West St., Arlington, TX. I understand that I am free to withdraw my consent or discontinue participation at any time for any reason if I so desire. After I participate, I may decide not to allow the experimenters to use my data if I so decide. If I do not want the experimenters to use my data, I will inform them in writing that this is so.

Some of the benefits I may gain from this study are a deeper understanding of the experimental process, the experience of helping advance scientific knowledge, and a

contentment from helping learn how to improve the academic success of others from this research.

This study is being conducted by Ira Bernstein, Ph.D. and El Samuels, M.S.. Dr. Bernstein may be contacted by calling (817) 272-3183 or by e-mailing bernstein@uta.edu. El Samuels may be contacted by calling (817) 272-5243 or by e-mailing samuels@uta.edu. Feel free to contact either or both with any questions or concerns you may have about this study. This study has been approved by the Human Research Review Committee of the University of Texas at Arlington.

I hereby consent to participate in this study and understand the above information.

Signature of Student

Date

APPENDIX L

CATEGORIZATION OF COURSES INTO SCIENCE OR HUMANITIES CLASSES.
TWO COURSE NAMES WERE NOT CATEGORIZABLE: CONS (FOR
“CONSORTIUM_SCSU”) AND RLS (OUTDOOR_ADVENT). LITTLE WAS LOST
IN NOT CATEGORIZING THESE COURSES, BECAUSE ALL WERE
TRANSFERRED COURSES FOR WHICH GRADES WERE NOT AVAILABLE.

Science Classes

Humanities Classes

Subject	Abbreviation	Subject	Abbreviation
Architecture	ARCH	Accounting	ACCT
Biochemistry	BIOC	Advertising	ADVT
Biology	BIOL	African Studies	AFR
Child Development	C_D	Anthropology	ANTH
Chemistry	CHEM	Art	ART, ARTS
Computer Science	CICS, CSC, CSE, INSY	Art History	ARTH
Electrical Engineering	E_E, EE	Broadcast Comm	BCMN
Engineering	ENGR	Business Law	BLAW
Food Sci & Nutrition	FCS, H_S, NTDT, SMHM	Business Admin	BUSA, REAE
Geography	GEOG	Classical Literature	CLAS
Geology	GEOL	Communications	COMM
Health Education	HEED	Criminal Justice	CRCJ
Human Development	H_D, HDEV, HMS	Dance	DNCA, DNCE
Kinesiology	KINE	Economics	ECON, I_E
Mathematics	MATH	Education	ED, EDTC,

			EDUC
Medicine	MED	English	ENGL
Military Science	MILS	English as a Second or Foreign Language	
			ESOL
Neuroscience	NSC	Exercise and Sports	EXSA, XSS
Nursing	NURS	Family Issues	F_D
Physical Science	P_S	Finance and Banking	FINA,FNBK
Physics	PHYS	Foreign Languages	FLL, FREN, FORL, GERM, ITAL, LATN, SPAN
Psychology	PSYC	History	HIST
Sociology	SOCI	Honors Humanities	HONR
Women Studies	WOMS	Humanities	HUMA
Zoology	ZOOL	Insurance	INSU
		Journalism	JOUR
		Linguistics	LING
		Literature	USTD
		Management	MAE, MANA
		Marketing	MARK
		Music	MUSI
		Philosophy	PHIL

Political Science	POLS
Public Relations	PREL
Reading	READ
Religion	RELI
Social Work	SOCW
Speech	SPCH
Theater	THEA
Writing	WRIT

APPENDIX M

THE DEBRIEFING STATEMENT OFFERED
TO THE PARTICIPANTS OF STUDY 2

Further Explanation of the
Predictive Validation of a Non-Academic Measure of Academic Success (Zoom!)
Study

We are attempting to validate a scale that was designed to predict how well students do in college. Usually, people use some sort of intelligence test to predict how well someone will do in school. But, of course, it takes more than just intelligence to succeed in school. So, we are attempting to study the non-intellective things that help people succeed in school. Note that the validation of any scale is a never-ending process. This study is simply the first time the scale will be assessed for validity.

Most of the ideas about how to create this scale came from research into “resiliency.” The first selected further reading at the bottom of this page is a review of this research. In general, resilient people are ones who are able to overcome great adversity and “beat the odds” to succeed in school, careers, etc. We are trying to learn from these resilient people how to help students succeed in college.

The study in which you participated is designed to assess how well the scale actually predicts academic performance. Because the scale is meant to measure non-intellective factors, we must measure intelligence so that it can then be removed from the scale’s prediction of academic success. The particular instrument we used to measure intellectual ability was Sternberg’s Triarchic Abilities Test, which was designed to measure not only traditional intelligence (i.e., the “academic” intelligence measured by most IQ tests), but also what Sternberg calls “practical” and “creative”

intelligence. Practical intelligence measures how well one finds information to solve problems that have several solutions. Creative intelligence measures how well one find a unique and creative solution.

Of course, in order to see if our scale can predict academic success, we must see what kinds of grades the people taking the scale got so we can know how accurate our predictions were. Be assured that we will let *no one* see your grades, scale scores, intelligence scores, etc. All of the information we obtain is be kept strictly confidential. We ourselves won't even be looking at people individually anyway, so even we won't look at how you do as an individual. However, if you are interested in knowing what your scores are on the instruments you completed, contact El Samuels (office: 519 Life Science Building; phone: 817-272-52143; Email: samuels@uta.edu). Before you are allowed to see them, you will be asked to show your student, photo ID as proof of identity.

Once this scale has been validated to indeed measure academic success, it can be used for at least two purposes. First, scores on the scale should help college counselors better address their students' needs. Second, it should help scientists study how to help otherwise disadvantaged people succeed. Your participation will help us help others to succeed. Thank you.

Selected Further Reading

Garmezy, N. (1983). Stressors of childhood. In N. Garmezy and M. Rutter (Eds.), *Stress, coping, and development in children*. New York: McGraw-Hill, 43-84.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd Ed.). New York: McGraw-Hill.

Sternberg, R. J. (1984). What should intelligence test? Implications of a triarchic theory of intelligence for intelligence testing. *Educational Researcher*, 13, 5-15.

APPENDIX N

CORRELATIONS AMONG VARIABLES IN STUDY 2. SIGNIFICANT CORRELATIONS ARE IN BOLDFACE AND ARE ASTERISKED. ONE ASTERISK INDICATES A CORRELATION SIGNIFICANT AT $\alpha = .05$, TWO ASTERISKS INDICATE A CORRELATION SIGNIFICANT AT $\alpha = .001$. THERE WERE 272 PARTICIPANTS IN STUDY 2.

STAT-M

	ARI	Analytic	Practical	Creative	SMI	RLCQ
ARI	1.0	-.02	-.00	.02	.46**	-.00
STAT-M Analytic	-.02	1.0	.28	.33	-.34**	.12
STAT-M Practical	-.00	.28**	1.0	.37	-.37**	-.01
STAT-M Creative	.02	.33**	.37	1.0	-.28**	-.04
SMI	.46**	-.34**	-.37**	-.276	1.0	.32**
RLCQ	-.00	.12	-.01	-.04	.32**	1.0
MCS D	.27*	.06	.10	.04	-.08	-.11
Extroversion	-.00	.07	.20*	.20*	-.47	-.23*
Neuroticism	-.03	.07	.04	.14*	-.00	-.05
Agreeable	-.22**	.03	-.04	.17*	-.07	-.06
Conscientious	-.07	.04	.12	.24**	-.13	-.06
Openness	.20*	-.06	.12	-.10	-.15	-.03
Past GPA	-.02	.16*	.104	-.06	.10	.00
Present GPA	.04	.20*	.22*	.18*	-.13*	-.09
Cumulative GPA	.05	.21**	.24*	.18*	-.11	-.08
HS Rank	-.13	-.08	-.03	-.06	.02	.04
Hrs Passed:Attempted	-.04	-.13*	.09	-.15*	-.10	-.13

SAT Math	-.08	.43**	.28*	.42**	-.34**	.06
SAT Verbal	-.01	.22*	.34**	.41**	-.26*	-.11
SAT Combined	-.05	.37**	.35**	.47**	-.34**	-.03
ACT Math	-.07	.46**	.19	.35*	-.31*	.05
ACT English	-.02	.42**	.23	.37**	-.24	-.03
ACT Combined	-.11	.48**	.24	.38**	-.33*	-.05
Transferred Hours	.07	.13	.11	.06	-.04	.14
Yrs Btn HS & Coll.	-.01	.13	-.10	.05	-.01	.00
Economic Status	.06	.07	.23*	.05	-.07	.07
Age	.02	.17	.08	.13*	-.10	-.12

Appendix N continued

	Big Five					
	Social Desirability	Extro.	Neuro.	Agree.	Consc.	Open
ARI	.27*	-.00	-.03	-.22**	-.07	.20**
STAT-M Analytic	.06	.07	.07	.03	.04	.06
STAT-M Practical	.10	.20*	.04	-.04	.12	.12
STAT-M Creative	.04	.20*	.14*	.17*	.24**	.10
SMI	.08	-.47**	-.00	-.07	-.13	.15
RLCQ	-.11	-.23*	-.05	-.06	-.06	.03
MCSD	1.0	.15	-.01	-.09	-.00	.09
Extroversion	.15*	1.0	.06	-.02	.14	-.06
Neuroticism	-.01	.06	1.0	.15*	.20*	-.02
Agreeable	-.09	-.02	.15*	1.0	.21**	-.09
Conscientious	-.00	.14*	.20*	.21**	1.0	-.10
Openness	-.09	.06	.02	.09	.10	1.0
Past GPA	.09	.02	.02	.12	-.11	.14
Present GPA	.22*	.05	.00	.22**	-.03	.14*
Cumulative GPA	.19*	.04	.00	.21*	-.03	.16*
HS Rank	-.22	-.04	-.03	.01	-.01	-.01

Hrs Passed:Attempted	.16	-.01	-.08	.16*	-.05	-.00
SAT Math	.16	.12	.12	.07	.16*	.01
SAT Verbal	.17	.18	.06	.11	.14	.27**
SAT Combined	.18	.17*	.11	.11	.18*	.17
ACT Math	-.07	.14	.25*	-.21	-.14	.24*
ACT English	.08	.03	-.02	-.16	-.25*	.22
ACT Combined	.06	.05	.09	-.18	-.16	.25
Transferred Hours	.20*	.04	-.05	.04	-.04	.14*
Yrs Btn HS & College	-.14	.04	.01	.09	-.00	-.02
Economic Status	-.02	.09	.00	.03	-.04	-.01
Age	.13	.10	-.04	.15*	-.00	.12

Appendix N continued

	GPA			Hrs Passed	
	Past	Present	Cumulative	HS Rank to Attempted	
ARI	-.02	.04	.05	-.13	-.04
STAT-M Analytic	.16*	.20*	.21**	-.08	-.13*
STAT-M Practical	.10	.22*	.24*	-.03	.09
STAT-M Creative	.06	.18*	.18*	-.06	-.15*
SMI	-.10	-.13	-.11	.02	-.10
RLCQ	-.00	-.09	-.08	.04	-.13
MCSD	.09	.22*	.19*	-.22	.16
Extroversion	.03	.05	.04	-.04	-.01
Neuroticism	.02	.00	.00	-.03	-.08
Agreeable	.12	.22*	.21*	-.01	.16*
Conscientious	-.11	-.03	-.03	-.01	-.05
Openness	.14*	.14*	.16*	-.01	-.00
Past GPA	1.0	.86**	.86**	-.32**	.40**
Present GPA	.86**	1.0	.98	-.31**	.45**
Cumulative GPA	.86**	.98**	1.0	-.32**	.43**
HS Rank	-.32**	-.31**	-.32**	1.0	.01
Hrs Passed:Attempted	.40**	.45**	.43**	.01	1.0

SAT Math	.16	.32**	.29**	-.20*	-.09
SAT Verbal	.07	.26**	.24*	-.06**	-.15
SAT Combined	.13	.33**	.30**	-.14	-.14
ACT Math	.13	.23*	.18	-.10	-.14
ACT English	.13	.30*	.27*	-.05	-.10
ACT Combined	.14	.26*	.21	-.11	-.13
Transferred Hours	-.06	.05	.05	.10	-.06
Yrs Btn HS & College	.01	-.00	.01	.03	.00
Economic Status	.13	.15*	.17*	.01	.02
Age	.10	.15*	.21**	.08	-.08

Appendix N continued

	SAT			ACT		
	Math	Verbal	Combined	Math	English	Combined
ARI	-.08	-.01	-.05	-.07	-.02	-.11
STAT-M Analytic	.43**	.22*	.37**	.46**	.42**	.48**
STAT-M Practical	.28*	.34**	.35**	.19	.23	.24
STAT-M Creative	.41**	.41**	.47**	.35*	.37**	.38**
SMI	-.34**	-.26*	-.34**	-.31*	-.24	-.33*
RLCQ	.06	-.11	-.03	.05	-.03	-.05
MCSD	.16	.17	.18	-.07	.08	.06
Extroversion	.12	.18*	.17	.14	.03	.05
Neuroticism	.12	.06	.11	.25*	-.02	.09
Agreeableness	.07	.11	.11	-.21	-.16	-.18
Conscientiousness	.16*	.14	.18*	-.14	-.25*	-.16
Openness	.015	.27*	.17*	.24*	.22	.25*
Past GPA	.16	.07	.13	.13	.13	.14
Present GPA	.32**	.26**	.33**	.23*	.30*	.26*
Cumulative GPA	.29**	.24*	.30**	.18	.27*	.21
HS Rank	-.20*	-.06	-.14	-.10	-.05	-.11

Hrs Passed:Attempted	-.09	-.15	-.14	-.14	-.10	-.13
SAT Math	1.0	.50**	.86**	.68**	.49**	.63**
SAT Verbal	.50**	1.0	.88**	.35**	.64**	.63**
SAT Combined	.86**	.88**	1.0	.59**	.67**	.74**
ACT Math	.68**	.35	.59**	1.0	.44**	.72**
ACT English	.49**	.64**	.67**	.44**	1.0	.85**
ACT Combined	.63**	.63**	.74**	.72**	.85**	1.0
Transferred Hours	-.02	.03	.00	.02	.09	-.00
Yrs Btn HS & Coll.	.01	-.01	.00	-.12	.06	.01
Economic Status	.09	.16*	.15	.20	.13	.17
Age	.08	.22*	.18*	-.14	.07	-.00

Appendix N continued

	Transferred Credit Hours	Years Between HS and College	Economic Status	Age
ARI	.07	-.00	.06	.02
STAT-M Analytic	.13*	.13	.07	.17*
STAT-M Practical	.11	-.10	.23**	.08
STAT-M Creative	.06	.05	.05	.13
SMI	-.04	-.01	-.07	-.10
RLCQ	.14	.00	.07	-.12
MCSD	.20*	-.14	-.02	.13
Extroversion	.04	.04	.09	.10
Neuroticism	-.05	.01	.00	-.04
Agreeable	.04	.09	.03	.15*
Conscientious	-.04	-.00	-.04	-.00
Openness	.14*	-.02	-.01	.12
Past GPA	-.06	.01	.13	.10
Present GPA	.05	-.00	.15*	.15*
Cumulative GPA	.05	.01	.17*	.21**
HS Rank	.10	.03	.01	.08
Hrs Passed:Attempted	-.06	.00	.02	-.08

SAT Math	-0.02	.01	.09	.08
SAT Verbal	.03	-.01	.16*	.22*
SAT Combined	.00	.00	.15	.18*
ACT Math	.02	-.12	.20	-.14
ACT English	.09	.06	.13	.07
ACT Combined	-.00	.01	.17	-.00
Transferred Hours	1.0	.35**	.06	.30**
Yrs Btn HS & Coll.	.35**	1.0	.13	.10
Economic Status	.06	.13	1.0	.39**
Age	.30**	.10	.39**	1.0

APPENDIX O

SUMMARY OF EACH STEP OF THE RESULTS OF THE 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.

β Weights

Model	β Weights														
					STAT-M			Big Five							
Criterion	<i>R</i> ²	<i>F</i>	<i>k</i>	<i>N</i>	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	-
	.20	-	9	116	.26	.13	-.03	.12	.28	-.00	-.06	-.13	-	.00	-
	.11	-	4	123	.19	.16	.09	-	-	-	-	-	-	.01	-
	.10	-	3	150	.24	.12	.04	-	-	-	-	-	-	-	-

β Weights

Model	STAT-M					Big Five									
	<i>R</i> ²	<i>F</i>	<i>k</i>	<i>N</i>	Anal.	Pract.	Creat.	Extr.	Agree.	Neur.	Cons.	Open.	SMI	MCSD	ARI
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	-
	.17	-	9	116	.19	.09	.02	.14	.27	.01	-.12	-.12	-	.05	-
	.08	-	4	123	.14	.13	.12	-	-	-	-	-	-.02	-	-
	.08	-	3	150	.20	.10	.07	-	-	-	-	-	-	-	-

β Weights

Model					STAT-M		Big Five								
	<i>R</i> ²	<i>F</i>	<i>k</i>	<i>N</i>	Anal.	Pract.	Creat.	Extr.	Agree.	Neur.	Cons.	Open.	SMI	MCSD	ARI
Past GPA	.25	1.83	11	105	.29	.05	-.14	.09	.34	.03	-.14	-.18	-.11	.02	.20
	.23	-	10	104	.31	.09	-.12	.15	.30	.02	-.16	-.19	.05	.08	-
	.23	-	9	99	.28	.08	-.12	.15	.29	.02	-.18	-.19	-	.09	-
	.08	-	4	105	.21	.11	.00	-	-	-	-	-	-	.06	-
	.04	-	3	131	.19	.07	-.02	-	-	-	-	-	-	-	-

β Weights

Model	STAT-M				Big Five											
	<i>R</i> ²	<i>F</i>	<i>k</i>	<i>N</i>	Anal.	Pract.	Creat.	Extr.	Agree.	Neur.	Cons.	Open.	SMI	MCSD	ARI	
Science GPA	.21	6.15	11	112	.25	.06	-.08	-.04	.30	.01	-.10	-.18	-.13	-.05	.26	
	.16	-	10	114	.27	.09	-.03	.06	.27	.02	-.11	-.15	.02	.06	-	
	.16	-	9	116	.24	.10	-.03	.05	.24	.02	-.12	-.15	-	.02	-	
	.08	-	9	123	.20	.12	.05	-	-	-	-	-	-	-.02	-	
	.11	-	3	150	.26	.13	.04	-	-	-	-	-	-	-	-	
Hum. GPA	.17	4.16	10	107	.22	.11	-.04	.05	.28	.01	-.01	-.07	-	.04	.22	
	.14	-	9	108	.19	.10	-.01	.04	.24	.02	-.04	-.10	-	.12	-	
	.08	-	4	115	.17	.12	.05	-	-	-	-	-	-	.11	-	
	.05	-	3	142	.17	.10	-.01	-	-	-	-	-	-	-	-	

β Weights

Model	β Weights														
	STAT-M					Big Five									
Criterion	<i>R</i> ²	<i>F</i>	<i>k</i>	<i>N</i>	Anal.	Pract.	Creat.	Extr.	Agree.	Neur.	Cons.	Open.	SMI	MCSD	ARI
SAT Comp	.62	< 1	11	64	.24	.01	.57	-.07	.02	-.14	.03	-.20	-.14	-.13	.06
	.61	-	10	65	.25	.02	.59	-.06	.01	-.15	.03	-.22	-.10	-.12	-
	.61	-	9	66	.28	.08	.56	.00	-.01	-.15	.01	-.19	-	-.12	-
	.51	-	4	69	.35	.19	.41	-	-	-	-	-	-	-.08	-
	.39	-	3	96	.41	.20	.21	-	-	-	-	-	-	-	-

β Weights

Model	β Weights														
	STAT-M					Big Five									
Criterion	<i>R</i> ²	<i>F</i>	<i>k</i>	<i>N</i>	Anal.	Pract.	Creat.	Extr.	Agree.	Neur.	Cons.	Open.	SMI	MCSD	ARI
ACT Comp	.59	< 1	11	33	.26	.13	.27	.15	-.20	-.20	-.36	-.24	-.12	.09	.03
	.59	-	10	33	.26	.14	.28	.15	-.20	-.21	-.36	-.23	-.09	.09	-
	.59	-	9	33	.30	.16	.29	.19	-.19	-.23	-.36	-.22	-	.09	-
	.42	-	4	36	.33	.17	.39	-	-	-	-	-	-	.03	-
	.31	-	3	45	.39	.19	.21	-	-	-	-	-	-	-	-

β Weights

Model	β Weights														
	STAT-M					Big Five									
Criterion	<i>R</i> ²	<i>F</i>	<i>k</i>	<i>N</i>	Anal.	Pract.	Creat.	Extr.	Agree.	Neur.	Cons.	Open.	SMI	MCSD	ARI
HS Rank	.17	< 1	11	59	-.11	.22	-.07	.21	-.28	-.09	.07	-.02	.18	-.24	-.11
	.15	-	10	60	-.11	.20	-.09	.17	-.25	-.10	.02	-.12	.11	-.23	-
	.13	-	9	61	-.14	.12	-.07	.10	-.22	-.08	.04	-.15	-	-.23	-
	.04	-	4	65	-.12	.12	-.01	-	-	-	-	-	-	-.14	-
	.03	-	3	91	-.17	.03	.01	-	-	-	-	-	-	-	-

APPENDIX P

GLOSSARY OF SOME OF THE ABBREVIATIONS USED IN THESE STUDIES

Abbreviation	Explanation
ARI	Academic Resilience Inventory; the scale designed and tested in these studies
Big Five	The five most robust personality constructs (Goldberg, 1981), Extraversion, Neuroticism, Conscientiousness, Agreeableness, and Openness; also referred to as OCEAN (McCrae and Costa, 1986, 1987; 1996)
ES	Economic standing, as measured by dividing the approximate, self-reported household income by the number of self-reported members of that household
MCSD	Crowne and Marlowe's (1964) Social Desirability Scale; measures one's propensity to respond with a socially-desirably response instead of an accurate response
NCQ and NCQ-R	Tracey and Sedlacek's (1984) Non-Cognitive (NCQ) and (1989) Non-Cognitive Questionnaire-Revised (NCQ-R), these instruments were designed to predict academic success with equal validity for all applicants, thus establishing a level playing

field for minority applicants

OCEAN	See Big Five
RLCQ	Miller and Rahe's (1997) Recent Life Changes Questionnaire; a descendent of Holmes and Rahe's (1967) Social Readjustment Rating Scale, the RLCQ is a measure of the number and cumulative intensity of major, stress-inducing life event
SMI	Dishman, Ickes, and Morgan's (1980) Self-Motivation Inventory; originally used to measure motivation to adhere to an exercise regimen, has been subsequently found to be useful as a general measure of one's motivation to sustain a course of action
SPOOL	The undergraduate Subject POOL from which many of the participants were recruited; students enter the SPOOL in the semester in which they enroll in the Introduction to Psychology course
STAT-M	Sternberg's (1991c) Sternberg Triarchic Abilities Test–Modified: Abbreviated Version; designed to measure what Sternberg called creative and practical intelligence, in addition to the academic (or

analytic) intelligence Sternberg argues is the primary construct measured by traditional intelligence tests like most IQ tests

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BIOGRAPHICAL INFORMATION

El Samuels earned his Master's degree under Dr. Joe Jackson, studying the mechanisms of learning and memory retrieval for Pavlovian taste aversions conditioned over long inter-stimulus intervals; much of his research philosophy grew out of the meticulous designs necessary to conduct animal learning research. Nonetheless, most of the presentations he has given, as well as all of his graduate publications, addressed education and the most effective ways to teach both students and pre- and in-service teachers, especially vis-à-vis the relative advantages of student-centered and multi-modal teaching strategies versus other methods. A advocate of learning and education on all levels and in nearly all ways, he thoroughly enjoyed teaching Introduction to Psychology, Experimental Psychology, Behavior and Motivation, and other classes, as well as being the teaching assistant for several classes, including a special, high-profile, intensive summer session in introductory psychology and behaviorism for advanced high school students. El Samuels was very fortunate to be able to combine all of his interests, expertise, and passions as the Director of the ASPCA's Humane Education Department, after "graduation." He hopes someday to return to academia, or to help create schools and otherwise bring education to areas where it is most needed.