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MAJOR ARTICLE



Resilience Resources Scale: A brief resilience measure validated with undergraduate students

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ABSTRACT

Objective: This paper presents a theory-based brief resilience scale, the Resilience Resources Scale (RRS), and evidence for its factor structure, reliability, and validity in two studies of undergraduate students. **Participants:** Study 1 sampled 295 students and Study 2 sampled 244 students. **Methods:** Study 1 participants completed the RRS and other measures online at one of two time points eight weeks apart ($n=193$), or at both time points ($n=102$). Study 2 participants completed the RRS and other measures online on a single occasion. **Results:** Factor analyses provided evidence for a one-factor model. Results indicated high internal consistency and strong test-retest reliability. Evidence of concurrent and predictive validity is presented. **Conclusions:** The RRS measures resilience resources known to be protective of physical and mental health. This brief scale has sound psychometric properties in these initial studies of undergraduate students. We offer possible directions for use of the RRS in this and other populations.

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College students; emerging adults; mental health; resilience; resilience measure

Emerging and young adulthood are characterized by many transitions, including increasing independence, extensive physical changes, and possible initiation of intimate relationships.^{1,2} New opportunities for risky behaviors, such as the use of substances,³ together with a strong desire for social belongingness⁴ also occur during this life period. These transitions can be difficult and stressful. Additionally, students tackle heavy academic loads, often combined with part-time employment, thus posing constant, challenging daily demands and financial worries.⁵ Anxiety, depressive, and substance use disorders can emerge during this time period and currently, students are seeking treatment at unprecedented rates, leading campuses to mount increasingly intensive prevention and treatment efforts.^{6,7} In particular, institutions of higher learning are more concerned than ever before with assisting students in managing stress.⁸ All of this has been further exacerbated by the changes brought about by the COVID-19 pandemic that portends increasing stress for college students.

In facing these substantial and chronic sources of stress, some young individuals effectively cope and adapt whereas others demonstrate an inability to do so. If cognitive and behavioral coping efforts to manage stress are not effective, demands can have deleterious effects on health and well-being over time.^{9–12} Whether stressors are acute or chronic, the ability to respond effectively is crucial to adaptation

throughout the lifespan.^{10,13} Resilience is the process of withstanding and coping with demands while maintaining healthy functioning in various life domains, including academics and social life.^{14–16} Because emerging and young adults enrolled in higher education are especially vulnerable to stress, it is critical to study resilience in this population.

Resilience has been defined in many ways, but it has primarily been described as either an outcome of successful coping, as an emotional trajectory following a major event, or as the capacity to manage major stressors.^{17–19} Resilience can also be conceptualized through a systems framework, as the capacity of a system or individual to adapt successfully to challenges that threaten the system's function, survival, or development.¹⁷ Factors that promote the ability to successfully adapt and be resilient are referred to as *resilience resources*²⁰ and include personal resources, such as mastery, and social resources, such as social support. Personal and social resources are important throughout life.^{21–23} Resilience resources are similar to, and often overlap with, coping resources^{23,24} in that they promote successful coping with stress. However, resilience resources are best viewed as capacities that help foster or promote coping resources in the face of adversity. A review of the literature substantiates that a resource-focused approach to measuring resilience allows researchers to understand the specific factors that contribute to an individual's resilience capacity and

may also inform interventions that aim to strengthen them.^{20,25,26}

There are several resilience resources that have been studied in the general population, however, some are more relevant for emerging and young adults than others. Among the most commonly studied relevant resources in the literature shown to be associated with mental and physical health are individual difference concepts such as self-esteem, mastery, and dispositional optimism.^{10,27–29} Additionally, researchers have found that perceived social support, familism, spirituality and religiosity, and purpose in life are associated with positive mental and physical health outcomes.^{30–34} All of these concepts may be particularly relevant to resilience capacity within the college and university contexts when individuals begin to explore their identities and make personal and professional life decisions with enduring consequences.^{2,35,36} For example, high self-esteem may enable young adults to resist the temptation to engage in risky behaviors that are harmful, and high mastery may enable a person to attempt to exert control and perseverance rather than giving up following a poor grade on an exam or a failed course in college. Several of these concepts are umbrella constructs for other important resilience resources. For example, mastery, self-efficacy, and locus of control are similar concepts and thus, can be seen as a singular resilience resource that represents one's belief that they have the capacity to deal with their life's circumstances.

A brief resilience scale that measures established resources can be useful in understanding a person's capacity to cope and effectively adapt in the face of stress. There is a high prevalence of stress and mental health problems among undergraduate students on college campuses and there are specific stressors that are particular to the developmental period that emerging and young adults face. Given these issues, there is a pressing need to identify strengths in addition to risk factors in undergraduate university populations with the aim of targeting and providing assistance to those most at risk and to shift focus on preventing, rather than treating, physical and mental health issues that arise in this specific population.^{37,38}

There is currently no clear consensus on the best instrument to measure resilience in this population.³⁹ A systematic review of 15 existing measures³⁹ noted that three resilience scales have the strongest psychometric qualities: the Connor Davidson Resilience Scale (CD-RISC),⁴⁰ the Resilience Scale for Adults (RSA),⁴¹ and the Brief Resilience Scale (BRS).⁴² Two of these, the CD-RISC and the RSA, are lengthy. For many applications, including widespread assessment in university settings, a briefer resilience scale is desirable in order to maximize the chances that participants will complete all items without becoming bored or fatigued. Examples of widely-used and validated brief instruments are the Perceived Stress Scale (PSS)⁴³ and the Life Orientation Test–Revised (LOT-R),²⁹ which each have 10 or fewer items. The widespread use of these instruments is due in part to their brevity. One resilience scale, the BRS, has only 6 items, but it concentrates exclusively on resilience defined as the ability to recover easily or quickly from stressors. Although

this is a reasonable approach, it does not capture some of the factors that contribute to resilience capacity that are present before the process of recovery from the impact of the stressor occurs.

In light of the foregoing, the purpose of this study was to develop and validate a brief resilience scale that would capture a range of personal and social resources founded in existing research. The Resilience Resources Scale (RRS) is a 12-item self-report instrument based upon existing theory and evidence on stress and coping.

Methods

The current research consists of two studies. Study 1 provided initial data on the reliability, validity, and factor structure of the RRS in undergraduate students at a large, diverse university in the western region of the United States in the spring of 2015. Study 2 replicated and expanded the work in the same population in the spring of 2018 in order to test convergent validity with two other published resilience scales and to further assess the scale's factor structure using confirmatory factor analysis (CFA).

Study 1 Methods

Participants

A sample of 4000 students (2000 undergraduate, 2000 graduate) at a large public university were randomly selected from the registrar's database as part of a larger study, the Stress and Resilience Assessment (SARA). Graduate students were excluded from the current study sample as the focus of this study is resilience in undergraduate students. The current study sample includes the 295 undergraduate students who completed the resilience measure at one or both time points in the larger study.

Participants ranged in age from 17 to 24 ($M=19$, $SD=1.4$).¹ Of these, 25% ($n=74$) were male, 72% ($n=212$) were female, and 3% ($n=9$) did not specify. The study's participants were 38% ($n=112$) Asian, 25% ($n=73$) White, 16% ($n=47$) Hispanic/Latino, 16% ($n=48$) "Other" including Mixed (8.1%), Middle Eastern (3.7%), South Asian (2.4%), Black/African American (1%), Native American (0.3%), Pacific Islander (0.7%), and 5% ($n=15$) did not report their race/ethnicity. These students were comparable in gender and demographics to the campus as a whole except that there were relatively more women in the sample than on campus (75% vs. 55%) and less racial/ethnic representation, especially of Black/African American students.

Procedure

Consent forms and surveys were delivered via email to students in the larger study. Prior to beginning the survey, students were informed that the study would take two sessions spaced eight weeks apart (T1, T2) and would require 15 to 20 minutes each. After completing each assessment session,

¹Only one participant was 17 years old.

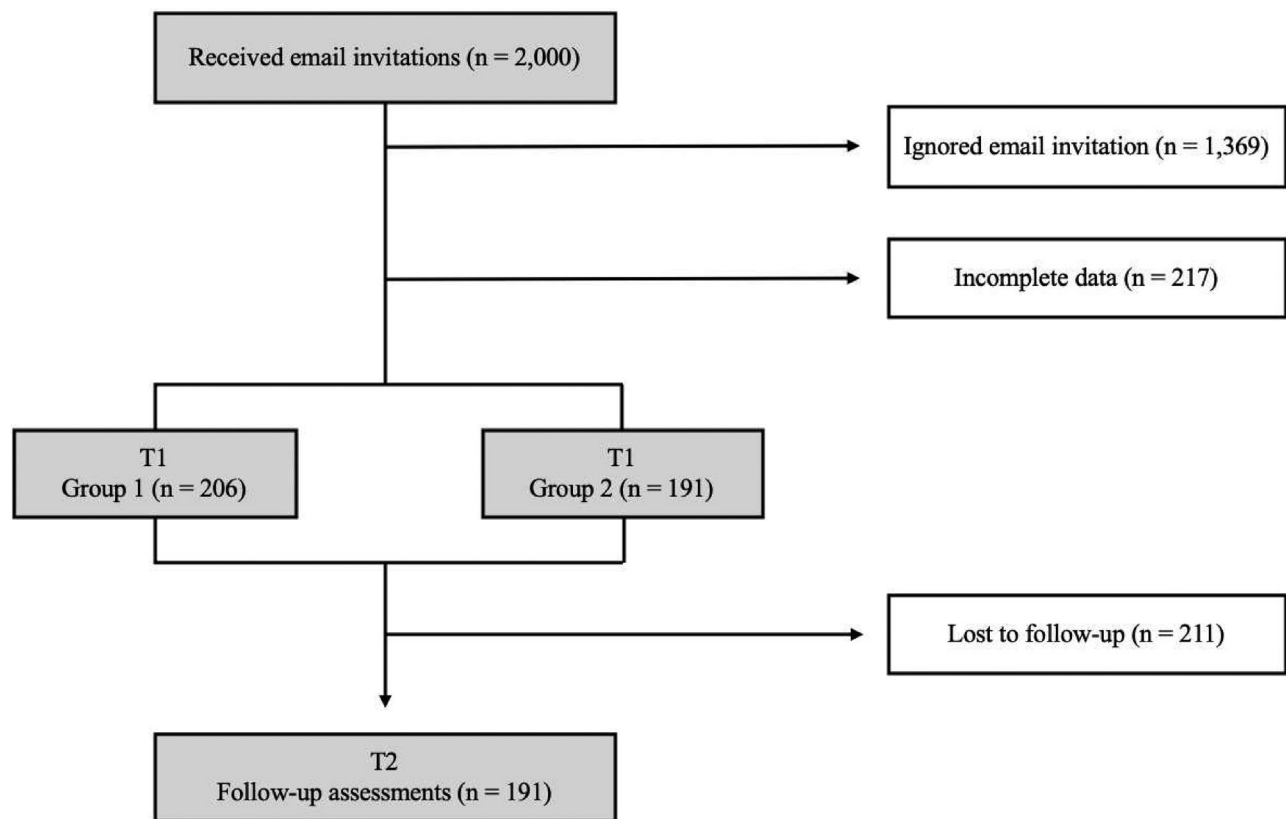


Figure 1. This figure presents a CONSORT diagram of the larger Stress and Resilience Assessment (SARA) study showing reasons for exclusion from the current study. At T1, Group 1 received the Stress and Resilience Assessments, demographics and validity assessments. At T1, Group 2 received demographics and validity assessments only. Both groups received all assessments at T2.

students were entered into a lottery for cash prizes up to \$200.

The aim of the larger SARA study was to survey students on a variety of topics including knowledge and use of campus resources. To determine whether feedback on personal levels of stress and resilience would prompt use of more campus services utilization, participants were randomized into one of two groups (Figure 1). The first group (Group 1) was asked to complete measures of stress and resilience on both occasions and received feedback on personal stress and resilience levels after the first assessment, whereas the second group (Group 2) received the stress and resilience measures only at T2. The surveys for both groups at both time points contained standardized scale measures of physical and mental health and well-being. The RRS was administered to Group 1 at both T1 and T2 and administered to Group 2 only at T2. The randomization did not have a statistically significant impact on resource utilization or other study variables; group assignment is not pertinent to this study and is not discussed further. The response rate for the undergraduates in this study was 20%, which was comparable to the response rate in similar surveys in this campus population.⁴⁴ All procedures were approved by the university's Institutional Review Board (IRB).

Measures

For both Studies 1 and 2, we programmed an online survey into a commercial software (Survey Monkey) that included

the resilience measure together with measures of background demographics, life stress, knowledge of campus resources, and physical and mental health and well-being.

Resilience Resources Scale. The goal in developing the RRS was to create a brief self-assessment scale that would measure established personal and social resources constituting psychological resilience. The senior author (CDS) was approached by a colleague studying student wellness within a larger healthy campus initiative (UCLA Healthy Campus Initiative) to develop a brief resilience scale to be used in a large student survey. For several years prior to the development of this instrument, teams of undergraduate students in an honors seminar on stress, coping, and resilience worked on the topic of resilience under her supervision. They drew from their own experiences and based their work in the existing literature with the aim of conceptualizing and measuring resilience in the context of stress in college and university students. The result was a long list of possible concepts and measures that might constitute resilience resources. Several scales were piloted on surveys of approximately 150–200 undergraduates over a decade, and hypotheses regarding their associations with measures of health and well-being were tested informally. In addition, from 2007 to 2010, an National Institutes of Health (NIH)-funded community-partnered network developed a conceptual framework for studying resilience in low-income adults of child-bearing age drawing in part from this earlier work.²⁰ Both prior research projects informed

Table 1. Content and item sources of the Resilience Resources Scale (RRS).

Variable	RRS Item Content	Item source
Self-Esteem 1	I take a positive attitude toward myself.	Rosenberg Self-Esteem Scale ²⁸
Self-Esteem 2	I feel that I have a number of good qualities.	Rosenberg Self-Esteem Scale ²⁸
Mastery 1	I can do just about anything I really set my mind to.	Pearlin Mastery Scale ¹⁰
Mastery 2	What happens in the future mostly depends on me.	Pearlin Mastery Scale ¹⁰
Optimism 1	In uncertain times, I usually expect the best.	Life Orientation Test-Revised (LOT-R) ²⁹
Optimism 2	I'm always optimistic about my future.	Life Orientation Test-Revised (LOT-R) ²⁹
Familism 1	When I have problems, I can count on help from my relatives.	Adapted from The Familism Scale ⁶⁴
Spirituality and Religion 1	I find strength and comfort in my religion.	Adapted from the Daily Spiritual Experience Scale (DSES) ⁶⁵
Spirituality and Religion 2	I feel deep inner peace and harmony.	Adapted from the Daily Spiritual Experience Scale (DSES) ⁶⁵
Purpose in life 1	I feel a sense of purpose in my life.	Functional Assessment of Chronic Illness Therapy-Spiritual Well-being Scale – Extended (FACIT-Sp-Ex) ⁶⁶
Social Support-Seeking 1	I can clearly express my needs to other people who are important to me.	Measure of Current Status (MOCS Part-A) ²⁷
Social Support-Seeking 2	I can go to people in my life for help or support when I need it.	Adapted from Measure of Current Status (MOCS Part-A) ²⁷

the development of this short instrument for emerging and young adults as part of a larger survey on student mental health and well-being (SARA).

The scale's specific items were selected from existing validated scales based on published data which suggested these items were good representations of the larger item pools and had good face validity. The constructs represented in the scale's 12 items are self-esteem (2 items), mastery (2 items), dispositional optimism (2 items), familism (1 item), spirituality and religiosity (2 items), purpose in life (1 item), and social support seeking skills (2 items). Scale items and their corresponding original sources are listed in Table 1. Respondents were asked, "Over the past month, how much do you agree with the following statements?" with responses ranging from 1 *strongly disagree* to 5 *strongly agree*. The total score was calculated by summing the item scores, with a possible range from 12 to 60. Higher scores reflected greater resilience.

PROMIS Depression and Anxiety. The 15-item Depression and Anxiety short form from the Patient-Reported Outcomes Measurement Information System (PROMIS)⁴⁵ was used to assess symptoms of depression and anxiety in both groups at both T1 and T2. This measure is reliable and valid for assessment of these current mood states. The eight PROMIS Depression items focus on affective and cognitive aspects of depression (e.g., worthlessness, sadness, loneliness). The seven PROMIS Anxiety items focus on fear, hyperarousal, and somatic symptoms related to arousal. Respondents were asked to rate how often they felt each symptom over the past seven days with responses ranging from 1 *never* to 5 *always* on a 5-point Likert scale.

The Satisfaction with Life Scale. The Satisfaction with Life Scale (SWLS)⁴⁶ is well-validated in a large variety of populations around the world, including college students.⁴⁷ The SWLS is a 5-item instrument measuring global satisfaction with life and was administered to both groups at both time points. Respondents were asked to indicate their level of

agreement or disagreement with each item with responses ranging from 1 *strongly disagree* to 7 *strongly agree* on a 7-point Likert scale.

Somatic symptoms. The Patient Health Questionnaire (PHQ-15)⁴⁸ is a brief measure of somatic symptoms and is widely used in a variety of populations, including college students. It consists of 15 somatic symptoms (e.g., stomach pain, back pain, dizziness) that are common in college students and capture physical and mental health concerns. The PHQ-15 was administered to both groups at both time points. Respondents were asked to indicate how much they have been bothered by each of the symptoms over the past month with responses ranging from 0 *not bothered at all* to 2 *bothered a lot* on a 3-point Likert scale.

Positive and negative affect. The Positive and Negative Affect Schedule (PANAS)⁴⁹ is a reliable and commonly used measure of affect and was administered to both groups at both time points. It consists of 20 words, ten each, to describe positive or negative feelings and emotions. Respondents were asked to indicate the extent to which they generally feel each emotion with responses ranging from 1 *never* to 5 *always* on a 5-point Likert scale.

Cronbach's alpha coefficients for the measures in the current study were as follows: PROMIS Depression scale ($\alpha = .93$), PROMIS Anxiety scale ($\alpha = .91$), SWLS ($\alpha = .88$), PHQ-15 ($\alpha = .83$), and PANAS (Positive Affect, $\alpha = .76$; Negative Affect, $\alpha = .71$).

Data analysis

We analyzed the data with SPSS (Version 24.0; IBM Corp., Armonk, NY). After basic descriptive analyses, we proceeded with two aims: (1) to examine the factor structure of the resilience scale in this population in order to determine whether multiple clusters of resources were revealed; (2) to test the reliability and validity of the resilience measure with respect to physical and mental health outcomes

Table 2. Item-total correlations and factor loadings from exploratory factor analysis of the Resilience Resources Scale (RRS).

Item	Item total correlations	Factor 1 loading	Factor 2 loading	Factor 3 loading
11. Positive attitude toward self (Self-Esteem 1)	0.79	0.85	−0.21	0.16
4. Optimistic about the future (Optimism 2)	0.74	0.79	−0.21	−0.06
6. Several good qualities (Self-Esteem 2)	0.70	0.75	−0.08	−0.04
12. Do anything (Mastery 1)	0.66	0.71	−0.09	0.34
2. Expect the best (Optimism 1)	0.67	0.71	−0.11	−0.06
1. Purpose in Life (Purpose in life 1)	0.68	0.71	0.03	0.06
5. Deep inner peace (Spirituality and Religion 2)	0.65	0.69	−0.21	−0.39
9. Seek help from others (Social Support-Seeking 2)	0.65	0.66	0.46	0.06
3. Express needs to others (Social Support-Seeking 1)	0.58	0.61	0.02	−0.09
8. Familism (Familism 1)	0.48	0.50	0.59	−0.04
7. Comfort in religion (Spirituality and Religion 1)	0.44	0.46	0.08	−0.36
10. Future depends on me (Mastery 2)	0.36	0.40	−0.03	0.42

concurrently and eight weeks later. The Cronbach's alpha coefficient was calculated to examine the scale's internal consistency and an intra-class correlation coefficient was calculated between the scale total scores at T1 and T2 to measure test-retest reliability in the subset of the sample who completed the RRS at both time points. Subgroup differences in RRS total scores were examined to consider any variation by race/ethnicity or gender. Correlational analyses were conducted to explore bivariate associations of the RRS and the PROMIS Depression and Anxiety, SWLS, PHQ-15, and PANAS scales to assess concurrent and predictive validity. It was expected that RRS total scores would be negatively correlated with PROMIS Depression and Anxiety, negative affect, and PHQ-15 scores, and would be positively correlated with SWLS and positive affect scores.

Study 1 results

Exploratory factor analysis

Exploratory factor analysis (EFA) of the RRS using principal axis factoring with direct oblimin rotation was recommended because two of the RRS items were negatively skewed (items 9 and 10), violating normality⁵⁰ and an oblique rotation was applied because any factors were assumed to be correlated.⁵¹ Approximately half of the variance was explained by the first factor (49%, Eigenvalue = 5.83), with very little additional variance accounted for by the next two factors (18%, Eigenvalues = 1.2 and 1.1 respectively). Factor loadings for all three factors are presented in Table 2. A scree plot was examined, and its pattern showed a sharp decline from the first component to the remaining components. Additionally, we used Tabachnick and Fidell's⁵² rule of thumb of 0.32 for the minimum loading of an item, which equals approximately 10% of overlapping variance with the other items in that factor. RRS items had primarily very strong loadings on the first factor (ranging from 0.40 to 0.85; Table 2), with only four items loading on this factor below 0.63. Furthermore, the possible second and third factors were moderately correlated with the first factor (factor 2: $r = 0.36$; factor 3: $r = 0.56$), were represented by only a few items, and lacked an obvious theoretical meaning. Therefore, a one-factor model seemed most appropriate. Total scores were calculated using all items in the RRS.

Scale reliability

The Cronbach's alpha coefficient for the full set of items in Study 1 was .90 and item-total correlations ranged from 0.36 to 0.79 (Table 2). To measure test-retest reliability, we analyzed the RRS total scores for the subset of 102 participants who completed the measure both at T1 and T2, 8 weeks apart. The intra-class correlation coefficient was 0.74, ($P < .001$), 95% CI [0.64, 0.82], suggesting strong test-retest reliability.

Gender and ethnic comparisons

The mean RRS score for the full sample in Study 1 was 43.2 out of the total possible of 60 ($SD = 8.9$). The distribution is shown in Figure 2. There was a significant, but small, difference between mean scores for males ($M = 41.2$, $SD = 9.9$) and females ($M = 43.8$, $SD = 8.4$), with females scoring higher, $t(284) = -2.53$, $P = .033$. There were no significant differences between the mean resilience scores for the three major ethnic groups: Caucasians ($M = 43.7$, $SD = 8.2$), Asians ($M = 41.7$, $SD = 9.7$), and Latinos ($M = 44.6$, $SD = 8.6$), nor were there interactions of gender by ethnicity.

Predictive and concurrent validity

Predictive validity was tested by computing bivariate correlation coefficients of the RRS total scores at T1 with scale measures of constructs expected to be associated with resilience at T2. Similarly, concurrent validity was tested for RRS total scores at T1 with these constructs at T1. All correlation coefficients appear in Table 3. Results indicated RRS scores had a significant, positive association with SWLS and with PANAS positive affect scores at both T1 and T2, with large effect sizes (r 's ranged from 0.56 to 0.65). RRS total scores also had significant, negative correlations at T1 and T2 with PROMIS Depression and PANAS negative affect scores. These effect sizes were large (r 's ranged from -0.50 to -0.63). The RRS total scores were also significantly negatively correlated with PROMIS Anxiety scores and with PHQ-15 scores at T1 and T2. These effect sizes were small to medium (r 's ranged from -0.17 to -0.39).

Study 2 Methods

The primary goals of Study 2 were to assess convergent validity of the RRS scale by comparing the scale's results with

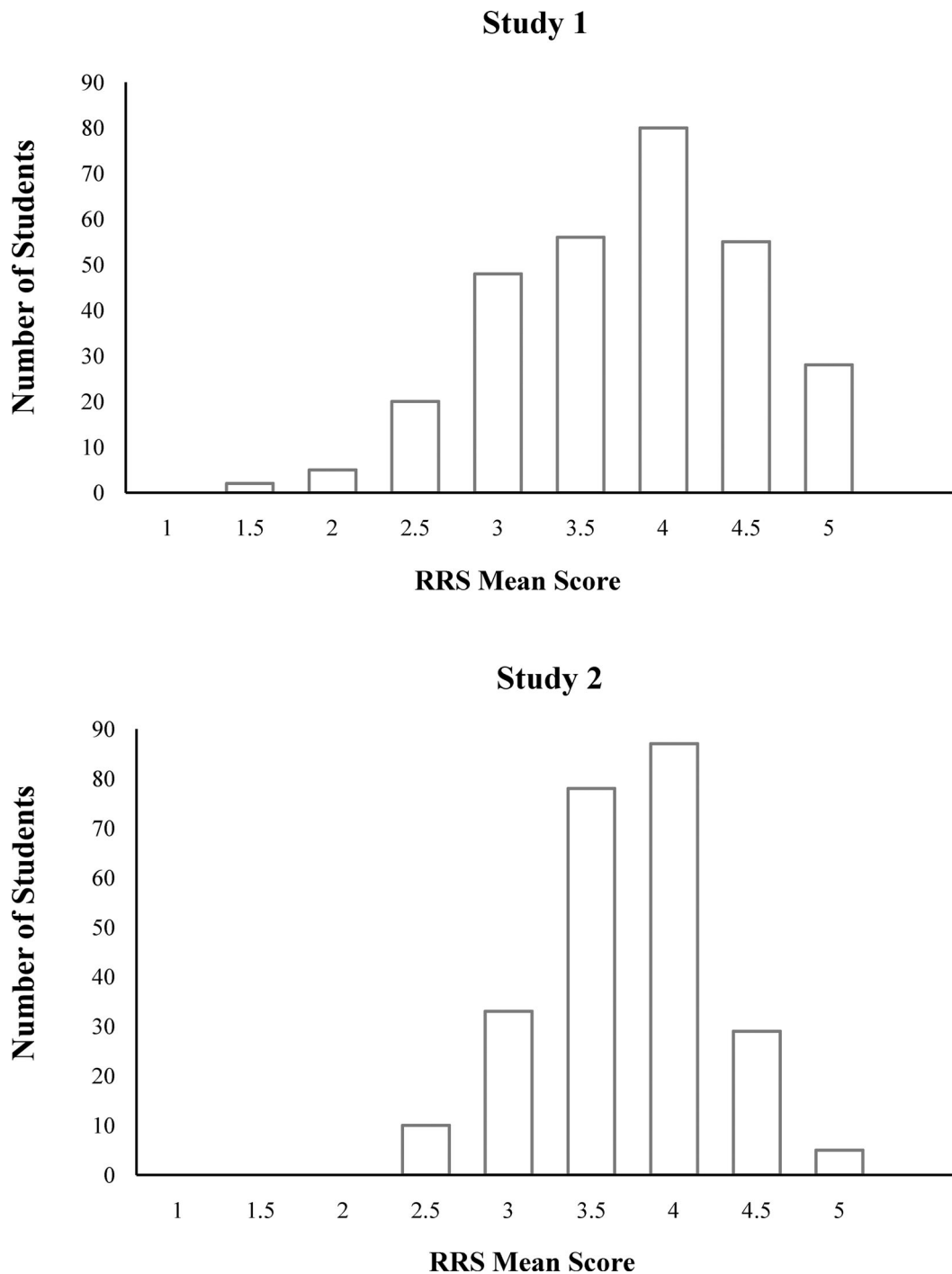


Figure 2. Distribution of Resilience Resources Scale (RRS) total scores for Study 1 (top) and Study 2 (bottom).

Table 3. Correlations between the Resilience Resources Scale (RRS) and other scales.

Measure	T1		T2	
	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>
Satisfaction with life (SWLS)	0.65**	107	0.56**	207
Positive affect (PANAS)	0.64**	102	0.61**	203
Depression (PROMIS)	-0.64**	104	-0.51**	206
Anxiety (PROMIS)	-0.39**	104	-0.37**	206
Negative affect (PANAS)	-0.51**	103	0.50**	204
Physical health (PHQ-15)	-0.35*	100	-0.17*	198

* $P < .05$.

** $P < .001$.

the BRS⁴² and the CD-RISC⁴⁰ and to further assess and confirm the factor structure of the RRS scale in a second sample of undergraduate students.

Participants

Participants for Study 2 were recruited through the psychology department's student subject pool at the same large public university as Study 1. The sample consisted of 244 undergraduate students who completed the RRS items and other measures online (Qualtrics) on a single occasion. The

Table 4. Correlations between the Resilience Resources Scale (RRS), Brief Resilience Scale (BRS), and Connor-Davidson Resilience Scale (CD-RISC) and other scales.

Other measure	Resilience measure		
	RRS	BRS	CD-RISC
Depression (PROMIS)	−0.53**	−0.42**	−0.54**
Anxiety (PROMIS)	−0.42**	−0.36**	−0.44**

** $p < .001$.

response rate for this study was 86%. Participants ranged in age from 18 to 29 ($M = 20.7$, $SD = 1.8$). The study's participants were approximately one-third Asian ($n = 75$, 31%), one-third non-Hispanic White ($n = 75$, 31%), and one-third Hispanic/Latino ($n = 43$, 18%) or Other ($n = 39$, 16%), including Black/African American, Middle Eastern, South Asian, or Mixed; 12 participants did not specify their race/ethnicity.

Procedures

Students provided study consent online and were then directed to an external survey link. They were informed the survey would ask them questions about their stress, mood, resilience, and demographic information and would take about 20 minutes to complete. All procedures were approved by the university's IRB.

Measures

The Study 2 survey included the RRS, the PROMIS Depression and Anxiety scales, and similar background socio-demographic measures to Study 1. The Study 2 survey also included additional measures of resilience, including the BRS and CD-RISC.

Brief Resilience Scale. The BRS⁴² is a brief 6-item resilience measure that primarily conceptualizes resilience as the ability to bounce back after a stressful event. Respondents were asked to indicate their level of agreement or disagreement with each statement about how they generally respond with responses ranging from 1 *strongly disagree* to 5 *strongly agree* on a 5-point Likert scale.

Connor-Davidson Resilience Scale. The CD-RISC⁴⁰ is a 25-item resilience measure. The scale's items measure personal and social factors that contribute to resilience. Respondents were asked to indicate their level of agreement or disagreement with each statement as it applied to them over the past month with responses ranging from 0 *not true at all* to 4 *true nearly all the time* on a 5-point Likert scale.

Data analysis

Convergent validity was assessed by conducting correlational analyses to explore bivariate associations of the RRS, BRS, and CD-RISC, by comparing their measures of internal consistency, and by comparing each of their correlations with the PROMIS Depression and Anxiety scales using SPSS (Version 24.0; IBM Corp.). A CFA using the *lavaan*⁵³ structural equation modeling package within the R project for

statistical computing⁵⁴ was conducted to test the one-factor model obtained in Study 1 and post hoc modifications were made if indicated. Goodness of fit statistics, including the model χ^2 , root mean square error of approximation (RMSEA), comparative fit index (CFI), Tucker-Lewis fit index (TLI) and standardized root mean square residual (SRMR) were used to indicate model fit. Evaluation of the models was based on generally acceptable guidelines for fit indices in structural equation modeling (χ^2 P -value $> .05$, RMSEA $< .08$, CFI $> .95$, TLI $> .95$, SRMR $< .08$).⁵⁵ The χ^2 statistic is reported but was not considered in determining the acceptability of model fit, as it is often recognized as having overly stringent criteria for larger samples.⁵⁶

Study 2 results

Convergent validity

The mean RRS score for the sample in Study 2 was 42.05 out of the total possible of 60 ($SD = 6.24$). The distribution is shown in Figure 2. The total RRS scores were significantly and moderately to highly correlated with both the BRS ($r = 0.49$, $P < .001$) and CD-RISC ($r = 0.69$, $P < .001$). The Cronbach's alpha coefficient for the RRS in Study 2 was $\alpha = .78$; for the BRS, $\alpha = .83$; and for the CD-RISC, $\alpha = .89$. Correlation coefficients between the scores on each resilience scale and the PROMIS Depression and Anxiety scores were comparable (Table 4). For example, total RRS scores and CD-RISC scores were both moderately correlated with PROMIS Depression scores ($r = -0.53$, $P < .001$; $r = -0.54$, $P < .001$, respectively).

Confirmatory factor analysis

Without modifications, the one-factor model originally specified by the Study 1 EFA provided a suboptimal fit to the data in Study 2, $\chi^2(54) = 151.95$, $P < .001$; RMSEA = 0.088, 90% CI [0.072, 0.105]; CFI = 0.968; TLI = 0.961; SRMR = 0.081. A post hoc model modification approach was used to improve the model fit based on examination of modification indices and consideration of items with overlapping content.⁵⁷ We determined that items 8 and 9 had very similar item content, both representing the extent to which one tends to seek help from others in times of need, either in general or from family members specifically. Further, upon inspecting the modification indices, we found that items 8 and 9 had highly correlated residuals ($MI = 26.19$). Thus, we tested a second one-factor model which allowed the residuals of these two items to correlate. The resulting model provided an acceptable fit to the data, $\chi^2(53) = 125.65$, $P < .001$; RMSEA = 0.077, 90% [0.060, 0.094]; CFI = 0.976; TLI = 0.970; SRMR = 0.074.

General discussion

The current study presents a brief scale designed to measure resilience among undergraduate students. We began with a conceptualization of resilience as a set of resources that promote stress management and adaptation. The scale was

developed for the purposes of widespread university testing and was validated in a sample of fairly diverse university undergraduate students. The initial tests of the scale showed unidimensional factor structure and sound psychometric properties, including strong internal consistency and test-retest reliability. The RRS also demonstrated predictive validity in the manner expected in relation to measures of life satisfaction, depressive and anxiety symptoms, somatic symptoms, and positive and negative affect. In a second study, it showed comparable internal consistency to the first study, and high correlations with two published measures of resilience, the BRS and CD-RISC. Notably, these are both scales that have been widely used to measure resilience in various populations but were not specifically developed to be used with young adults. The unidimensional structure of the RRS was further validated in the second study using confirmatory factor analysis to test the one-factor model obtained by use of exploratory factor analysis in the first study.

The unidimensional nature of the RRS is of interest because the scale was intentionally composed of many aspects of resilience that conceptually might be considered to be independent. However, past research has indicated that some of these intrapersonal resources, such as self-esteem, mastery, and optimism,^{58,59} are strongly related to one another. Additionally, using only one or two items from each dimension may have contributed to finding a primary factor, whereas longer item sets of each resource may lead to subscales of various interrelated but distinct components of resilience resources in future work.

The RRS has many advantages for use with students in higher education. First, research on university campus populations must investigate not only vulnerabilities, risk, or adversities, but also student strengths.⁶⁰ Too often the focus has been on deficits and problems after they occur. The purpose of this work was to refocus attention on strengths that can be studied in advance of stress-related physical and mental health concerns. The RRS offers a theory-based method of assessing the psychological resources that a person may possess at the outset of college. Second, its brevity makes it feasible to obtain high student completion rates in online surveys.

Third, this instrument may enable campuses to make headway on prevention by fostering awareness of factors that contribute to resilience and helping to build strengths in the student body via campus programs focused on them. For example, students may benefit from self-administration of the RRS with feedback included to inform them of their own personal resilience resource capacity, as was done in SARA. Skillfully designed feedback can empower individual students to appreciate their areas of strengths and to build resilience in areas of weakness, possibly through use of specific campus resources. Because the RRS assesses multiple resilience factors that contribute to resilience capacity as a whole, a person may be comforted to know that they possess some strengths, as well as some areas to develop and improve. Targeted feedback might consist of follow-up with further detailed self-assessments of specific resources (e.g.,

mastery, social support seeking skills). Students who are low in resources overall may be those who need additional assistance. The RRS could be particularly useful for targeting professional support for individuals in the first year of college. That said, it is not intended to be diagnostic and should be used in combination with other validated instruments to conduct mental health prevention screening. Finally, although this measure was developed for use with undergraduate students in mind, graduate students also experience significant stress, and their ability to be resilient is equally important. Future research should investigate the factor structure and validity of the RRS among graduate students.

A few limitations must be noted. First, despite the large sample that was recruited from a leading public university, the resilience levels observed in this study are not necessarily representative of the general population of college or university students, or even the student population from which we sampled. Compared to the undergraduate student body at this institution, there were slightly more women and fewer men in this sample. Further validation in additional and more representative college samples is recommended. Second, the RRS contains only positively phrased items and thus, does not control for response bias. Future developments of the scale may benefit from the inclusion of both negatively and positively worded items. On the other hand, taking a strengths-based approach may necessitate measuring mostly positive resources, as was done here.

Finally, the individual resource capacity in the RRS measure led to the decision to include a few items from a number of known resilience constructs. However, future versions of the RRS could be longer if supplemented with additional components. For example, persistence at tasks (which other resilience scales assess) is likely to be important, and certain emotion and problem focused coping skills are also known to be adaptive across life contexts.^{61–63} However, assessing a large repertoire of coping skills is time-consuming and may prohibit widespread use. One of the primary objectives in developing the scale was to keep it very brief.

In summary, the RRS is based on a conceptualization of resilience as a set of resources and is comprised of items from other previously validated scales. The current research demonstrates that the RRS is unidimensional and psychometrically sound in two samples of undergraduate students. As such, we hope it will be useful in future research with this population and possibly others. The RRS may be helpful for professionals developing campus resources because it can assist in guiding resilience awareness and development. It may be useful for students who complete the scale because it can inform them of their own strengths and areas of potential improvement.

Conflict of interest disclosure

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal

requirements, of the United States and received approval from the University of California, Los Angeles.

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