



OPEN A rank ordering and analysis of nine resilience competencies demonstrates the special importance of thought management in maintaining resilience

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Resilience has long been known to involve both innate personality characteristics and learned competencies. In the present study, we measured nine trainable competencies that empirical studies suggest are associated with resilience, and then we rank-ordered those competencies according to how well they predicted several desirable, self-reported life outcomes. We did so by analyzing data obtained from a diverse convenience sample of 5279 English-language speakers (mean age 30.5) from 104 countries (47.7% from the U.S.) who took a new online test of resilience. Participants were first asked various demographic and criterion questions and then took the 81-item, Likert-scale test. The competencies were: Copes Effectively with Past Traumas, Develops Mental and Physical Toughness, Maintains Advantageous Relationships, Manages Emotions Constructively, Manages Stress Effectively, Manages Thoughts Constructively, Practices Assertiveness, Seeks to Grow and Improve, and Solves Problems Effectively. The test had high internal-consistency reliability, and total scores were good predictors of whether someone had ever been in therapy, had ever been hospitalized for a mental health problem, was currently in therapy, had ever been diagnosed with a mental illness, as well as of happiness, personal success, professional success, and self-reported level of resilience. Test scores for people who reported having had resilience training were significantly higher than test scores for people who had no such training. Regression analyses showed that the resilience competency that best predicted desirable outcomes was Manages Thoughts Constructively. Unfortunately, participants scored relatively poorly on this competency (59.5%), while scoring highest on Maintains Advantageous Relationships (72.9%). A small effect was found for gender, with males outscoring females by 0.5%. Effects were also found for race/ethnicity, country, sexual orientation, educational level, parental status, employment status, marital status, and age. The study supports the value of a competencies approach to understanding resilience and calls special attention to the important role that thought management techniques may play in resilience.

Keywords Resilience, Epstein resilience inventory, ERI, Competency tests, Online tests, Psychological tests

Resilience—the ability that some people have to resist the ill effects of adversity or to recover quickly from adversity—has, in one form or other, been a topic of interest to researchers for at least a century^{1–5} and has been described in historical writings for perhaps thousands of years⁶. After the Civil War in the US, and especially after World War I, scholars have described the condition now called post-traumatic stress disorder (PTSD) and, more important, have noted individual differences in the way soldiers have reacted to the traumas of war^{7–9}.

Roughly speaking, soldiers returning from battle can be sorted into three categories: those who are severely impaired by their experiences^{9,10}, those who seem unaffected by them^{11,12}, and those who seem to have benefited from them—to be propelled forward, determined to enjoy life or make a positive difference in the world^{11,13–15}. Those individual differences—the fact that some people are able to cope with trauma better than other people

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can—have fascinated researchers and clinicians for decades. Are those differences determined mainly by genes and personality factors? Can experience make a difference? Can children or even adults be taught skills that will help them cope with adversity?

No matter what the genetic constraints might be, the possibility that learning or training can help people to cope—in other words, to become more *resilient*—is potentially of great practical value. If parents, teachers, members of the clergy, policy makers, military officers and political leaders knew how to boost resilience, the harm that trauma normally causes could, in theory, be greatly reduced.

A thorough review of theories of resilience is beyond the scope of this paper. We note, however, that some experts characterize resilience mainly as a personality trait^{11,16–24}—thus a characteristic with significant genetic foundations that is difficult to change—while others believe that it is a dynamic process, one that involves “a capacity that develops over time in the context of person-environment interactions”^{13,25–30}. Theories that emphasize the dynamic or changing aspects of resilience are consistent with the view that resilience can be affected by life experiences; to put this in more practical terms, to the extent to which resilience is a capacity that develops over time, we should be able to boost resilience through training. Is there evidence that training can indeed strengthen resilience?

This is an important question, because whatever the origins of resilience—genes, environmental interactions, training, or some combination thereof—resilience is beneficial. This has been found in military studies^{31–34}, studies of climate change^{35,36}, multiple studies conducted during the COVID-19 pandemic^{37,38}, studies in academic settings^{39,40}, studies of important close relationships⁴¹, and other demanding areas of life^{42–44}—even coping with disturbing aspects of “fake news”⁴⁵. If we understand resilience from a competencies perspective, we should reliably be able to measure and train the relevant competencies and thus *strengthen* resilience in virtually any challenging domain.

The training of resilience

A number of studies have shown that resilience can indeed be strengthened by training, almost always by using a competencies approach—even when the language of competence is not used. Some of these studies have been conducted by branches of the US military. For example, the US Army has offered Master Resilience Training (MRT) since 2009. In a 2013 study with more than 600 Army National Guard soldiers and civilians, researchers concluded that MRT produced beneficial effects, among them, “increased self-awareness and strength of character, including improved optimism, mental agility, and connection with others”³¹. The improvement in what were called “resilience competencies” was also associated with fewer behavioral health symptoms. MRT focused on six resilience competencies, as follows: connection, optimism, mental agility, self-awareness, self-regulation, and character strength. Other resilience training programs by military organizations in the US and elsewhere have also reported benefits from similar training^{32–34}.

MRT was based on a curriculum originally developed by the University of Pennsylvania, called the Penn Resilience Program (PRP)⁴⁶. Some evaluations of the PRP have reported positive outcomes of resilience training^{47–52}, but other evaluations have reported mixed or weak results^{53–55}, perhaps because of inadequacies in training or unusual characteristics of the training contexts⁵⁴.

MRT was also used with a group of 98 military personnel in Romania in a randomized controlled study published in 2024³³. MRT took place over a period of 5 months for the training group ($n = 48$); the control group ($n = 50$) was told that training would take place later. Changes were measured when training ended and at a 3-month follow-up. Improvements were significantly higher in the training group than in the control group, including an increase in resilience.

Another controlled study with military personnel, this time taking place over a 4-week period in Switzerland, used a competencies approach to train resilience, focusing on the following areas of skill and knowledge: considering individual emotions, thoughts, and behaviors; identifying values and core beliefs; identifying and modifying individual coping strategies; distinguishing different communication styles and detecting individual character strengths³². No actual measure of resilience competencies was employed in the study, however. Instead, the authors used eight existing tests—of coping strategies, self-efficacy, stress reactivity, and psychological well-being—to measure the impact of their resilience training program. Because of changes in test scores, they concluded that their training program was effective, although, as we noted, the researchers did not measure changes in resilience competencies per se.

A new study focusing on the training of “academic resilience” for teachers in India ($n = 97$) strengthened three skillsets: adaptability, persistence, and self-regulation. Adaptability was defined as “participants’ ability to adapt and react to unanticipated academic obstacles.” Persistence was defined as the “will to overcome barriers to achieve their educational objectives.” And self-regulation was defined as “participants’ time and resource management skills, indicating their ability to balance academic and personal lives”³⁹.

Another recent report described a 2-day program for strengthening six “organizational resiliency strategies” for 56 managers and directors of a nonprofit Canadian facility for treating mental health and substance abuse problems⁴⁴. This program included skills such as “creating psychological safety” and “innovation strategies.” In another Canadian study—this one quite small—nine parents in military families were taught resilience skills to help them cope when service members in their family were “called upon for combat, peacekeeping or pandemic/disaster-response”⁵⁶. Another new study—this one including a matched control group—focused on improving “emotional resilience” in adolescent females in the US ($n = 81$ in the treatment group; $n = 82$ in the control group)⁴².

Resilience training in the military is tailored to help soldiers cope with the specific kinds of stressors soldiers are likely to encounter. Another life challenge—climate change—has led to training programs that increase what is sometimes called “climate resilience.” In a recent study, six young people in Southern Haiti were given resilience training (although it was not labeled that way) to help them think critically about how to access clean

water in Haiti^{36,57,58}. The need for resilience in response to climate change was also discussed in a review paper by Sanson and Masten (2023)³⁵. They examined “the physical, social, and psychological impacts of exposure to climate disasters, which are already increasing in frequency and ferocity across the globe.” The authors outlined promising approaches and theories that might help people cope with climate change, focusing on three approaches: (1) risk reduction, which “aims to prevent or lower the intensity and cumulative level of threats to human survival and development,” (2) “boost[ing] access to resources associated with positive development,” and (3) “mobiliz[ing] powerful adaptive systems that buffer or protect against harmful effects of adversity and drive positive adaptation.”

Another 2024 study found that “positive thinking training” had beneficial effects on “improving resilience and life satisfaction among older adults”⁴³. Although this study did not use the language of competence, the weekly 90-min sessions in which people were taught positive-thinking techniques can certainly be viewed from a competence perspective. As we show later in this paper, the findings in this study⁴³ are consistent with the findings in the new study about which we are reporting.

A competencies approach to Understanding and improving performance

The present paper uses a competencies approach to understanding human behavior first introduced in the US in a paper published in the 1970s by American psychologist David C. McClelland⁵⁹. This approach has encouraged behavioral scientists and practitioners in a number of different fields to break down complex, somewhat mysterious traits—leadership, sales ability, emotional intelligence, creativity, and others—into measurable, trainable skills and types of knowledge. As McClelland argued, a competencies approach avoids the pitfalls and limitations of working with hypothetical constructs. It also avoids the labeling problem associated with trait inventories; labeling someone as a mediocre leader or as an uncreative person can be demoralizing, and it can also function as a self-fulfilling prophecy, preventing people from developing their full potential^{60–63}. Because competencies are measurable and trainable, scores on competencies tests simply indicate a person’s current level of ability; presumably, with further training, that ability will grow^{40,64,65}. As McClelland put it, “It seems wiser to abandon the search for pure ability factors and to select tests instead that are valid in the sense that scores on them change as the person grows in experience, wisdom, and ability to perform effectively on various tasks that life presents to him”⁵⁹.

McClelland tested his approach among executives of a large multinational corporation. He used behavioral-event interviews to identify key clusters of behaviors that effectively predicted the success of the executives⁶⁶. He was also able to give the executives feedback on ways they could improve their performance. Unfortunately, McClelland died shortly before this research was published, but following in his footsteps many other researchers globally have adopted a competencies based approach to improving people’s performance in many different fields^{67–70}.

Studies in the human resources literature also suggest that it is generally more economical for companies to train people—that is, to enhance existing skills and talents—rather than to hire people who supposedly have those skills and talents⁷¹. McClelland first used this approach to dispel the myth that leaders are born, not made; a competencies approach allows one to turn anyone into a better leader, no matter where he or she is starting from^{72,73}. The competencies approach to understanding and training complex behavior has proved helpful in multiple professions and disciplines: healthcare⁷⁴, education⁷⁵, business⁷⁶, and other areas in which human performance is important^{77–88}. As we noted above, it has also been used to analyze, measure, and train resilience.

Driver training is a good example of a complex performance that can be efficiently and effectively taught by using a competencies approach that focuses on specific behaviors⁸⁹. Professional driving instructors advise students to look at the rearview mirror and to turn their head to see if a car is nearby before changing lanes, for example. In a written test, authorities also look for specific knowledge that drivers should have—how much space there should be between their car and the car ahead of them on a highway, for example. To our knowledge, they never evaluate personality traits that might be associated with good driving: confidence, dexterity, patience, etc. Those traits are difficult, if not impossible, to change, which is why driving instructors focus on behaviors they can see and teach. They also pass or fail people on their road tests based on such behaviors⁹⁰.

Instruments that measure resilience from a traits perspective

The most widely used measure of resilience today appears to be the Connor-Davidson Resilience Scale (CD-RISC), mentioned above. The CD-RISC is a 25-item Likert-scale inventory, where higher scores indicate a higher level of resilience. This instrument, once again, uses a five-trait factor model. The first study offering empirical evidence of validity for this test was published in 2003¹⁹. A more recent study replicated Connor and Davidson’s (2003)¹⁹ original findings with a non-clinical population in Sweden, concluding that the CD-RISC was a good predictor of both “physical and mental health-related quality of life”⁹¹.

Most existing instruments that measure resilience look at it from a traits perspective. For example, an English and Dutch inventory called the Resilience Evaluation Scale (RES) measures two hypothetical constructs said to underlie the resilience trait: self-confidence and self-efficacy. Validation evidence for this inventory was presented in a study with 522 participants ($n = 296$ Dutch, $n = 226$ English)⁹². Validation evidence for a 10-item instrument called The Rugged Resilience Measure was obtained from a group of 5880 people from seven countries. All participants were in the age range 16 to 29, which is considered the target group for this instrument. Because of the brevity of the inventory, it measures resilience as a single trait⁹³. The Resilience Measurement Scale (RESI-M) was developed to measure resilience in family caregivers of children with cancer⁹⁴. It relies primarily on a five-factor trait model, and validation evidence was obtained in a study with 633 caregivers.

As we noted above, resilience training programs, such as the US Army’s MRT program, use a competencies approach to training resilience. When the goal is to *train or improve* resilience, a competencies approach is more appropriate than a trait approach. To measure the effectiveness of their Master Resilience Training program,

the Army developed a self-report measure that is more like an informal survey than a psychometric measure. Griffith and West (2013)³¹ reported reliability measures but no quantitative validity measures. Instead, they reported informally on how closely their items and factors matched those of the CD-RISC¹⁹, which, as we noted, measures traits, not competencies. We suggest that if the Griffith and West (2013)³¹ researchers had access to a validated study of competencies, they would have chosen to measure the changes in competencies directly rather than indirectly.

Because of the rapid growth of the internet over the past 20 years, the rate at which nonvalidated psychological tests have been posted online has increased steadily, and that trend will almost certainly continue. Unfortunately, users have no easy way to distinguish validated instruments from nonvalidated ones. Here are just two examples of nonvalidated resilience tests one can currently find online. The first, accessible at <https://mind.help>, is a 15-item inventory called, simply, “Resilience Test.” No psychometric data accompany the test, but its website says that it has been “verified” by the World Mental Healthcare Association, an organization in India. The second, a 10-item test—a mix of Likert-scale questions and multiple-choice questions—called simply the “Resiliency Test,” is accessible at <https://psychtests.com>. Again, no psychometric data are given. Both of these tests focus on traits, not competencies.

Instruments that measure resilience from a competencies perspective

At this writing, we are aware of only two validated instruments that measure resilience without using a traits approach, only one of which, in our view, can reasonably be called a competencies test. That test is the Mount Sinai Resilience Scale (MSRS)⁹⁵. The MSRS was developed, explicitly, to address “gaps in the resilience measurement literature by assessing thoughts and behaviors that help promote resilience rather than traits” (p. 408), one goal being to learn how resilience can be “taught or harnessed” (p. 408). Its practical applications—typical of competency tests—are noted in its clinical impact statement: The MSRS is offered as “a helpful tool for evaluating response to resilience-building or mental health interventions” (p. 408). Initially, 36 behaviors (or strategies) thought to underlie resilience were developed by a series of “expert consensus meetings and a thorough review of the resilience literature” (p. 411). No details were given about this process, unfortunately, and the relevant studies were not identified. With a sample of 1834 US adults from ages 19 to 78, a confirmatory factor analysis was used to reduce the number of items to 24.

The second instrument, the Interpersonal Resilience Inventory, asks people to identify various types of interpersonal interactions they have had, or to identify the outcomes of such interactions⁴¹. Although it does not use a traits approach to compute or interpret scores, it also does not identify specific competencies that can be measured or trained.

Although resilience-related and unique in the relevant literature, the MSRS is, in our view, limited in scope. Its brief instructions to participants (included in the online supplement to the published validation study) reads as follows: “Please rate how well each statement describes how you have managed stressful situations in the PAST MONTH [sic]. For each item, also rate how effective it has been in the PAST MONTH [sic] in helping you to manage stress”⁹⁵. From our perspective, both the instructions and the items themselves appear to be measuring competencies related to stress management, not to resilience, at least as resilience is normally defined (see above). We view stress management as an important component of resilience (which we identify as “Copes effectively with past traumas,” see Table 1); but, based on our review of relevant literature, we see that as only one of nine trainable competencies that underlie resilience (Table 1).

Above, we described a number of different programs that train resilience in particular domains: military, teaching, parenting, emotion management, refugee issues, climate change, and others. All of these programs necessarily focus on skills or competencies, but none, as far as we can tell, employed instruments to measure improvements in the competencies or skills they trained. Rather, they tended to employ the CD-RISC or measures of levels of stress—or, in some cases, informal questionnaires—to measure outcomes of the training. Except for the MSRS, validated instruments that broadly measure resilience competencies seem to be relatively rare.

Online, however, we did find two nonvalidated tests that purport to measure resilience competencies: the “How Resilient Are You?” test on Buzzfeed.com and the “Total Brain Resilience Test” at TotalBrain.com. Each of these brief tests claims to be scientifically rigorous, but no relevant citations or psychometric measures are given.

Development of the ERI questionnaire

In 2016, our research team began to search the relevant empirical literature to identify measurable, trainable competencies that had been found to be associated with resilience. Our goal was to create a practical new online questionnaire that might help both the general public and, perhaps, professional trainers and coaches, to increase people’s resilience by having them acquire certain knowledge and learn and practice certain behaviors. We generally avoided studies that looked at associations between resilience and various personality traits or cognitive states. Instead, we focused, as McClelland had and as behavior analysts still do today, on behaviors. Traits and cognitive states can be difficult to train^{40,65,96,97}. That is why behavior analysts focus on training specific behaviors – even on “pinpointing” behaviors that are especially easy to measure and train^{98,99}.

With this approach in mind, we found more than 60 studies that allowed us to delineate and define nine relatively distinct competencies that were associated empirically with resilience: Copes Effectively with Past Traumas, Develops Mental and Physical Toughness, Maintains Advantageous Relationships, Manages Emotions Constructively, Manages Stress Effectively, Manages Thoughts Constructively, Practices Assertiveness, Seeks to Grow and Improve, and Solves Problems Effectively. We also used these studies to help us develop a list of 81 items, each of which could be answered on a 5-point Likert scale (from Agree to Disagree), to help us measure the competencies. Below we will briefly explain how we employed empirical studies to develop each competency and the items of the new questionnaire. The competencies, their definitions, the items, and a selection of references

1. Copes Effectively with Past Traumas:
Moves on relatively quickly from traumatic events; attempts to find meaning in negative life experiences; seeks assistance as needed to help him- or herself cope with traumas; when possible, forgives him- or herself or those who have hurt him or her as a means of moving on.
Corresponding scored items:
7. I try not to think too much about bad things that have happened to me. 43. I try to forgive myself if I make a mistake. 46. When something bad happens, I sometimes use drugs or alcohol to make me feel better. <i>(reverse scored)</i> 50. I often turn to friends or relatives to help me deal with bad experiences. 53. I get back to my routines fairly quickly after something bad happens. 54. I'm willing to see a therapist if something bad has happened to me. 56. I find it easy to forgive people if they have hurt me in some way. 57. I always try to find meaning in the bad things that have happened to me.
References: 23,100–103,123–127
2. Develops Mental and Physical Toughness:
Affirms his or her strength and willingness to persevere; commits to setting aside fear and weakness; commits to completing what he or she starts; remains calm when criticized; takes criticisms as suggestions to improve him- or herself; maintains good physical and mental health through diet, exercise, rest, and other means.
Corresponding scored items:
15. I'm aware of and take pride in my strengths. 18. I always eat healthy foods. 22. I never let my fears hold me back. 32. I often get upset or angry when I'm criticized. <i>(reverse scored)</i> 36. I always make sure I get a good night's sleep. 42. I always finish what I start. 44. I exercise regularly. 67. When the going gets tough, I frequently just give up. <i>(reverse scored)</i>
References: 11,46,104–107,128,129
3. Maintains Advantageous Relationships:
Builds and maintains friendships, intimate relationships, and professional relationships; respects the views of others; listens well and asks others to share their opinions; apologizes when wrong and accepts the apologies of others; praises others and expresses affection when appropriate.
Corresponding scored items:
8. I often ask for feedback from other people. 21. I have trouble apologizing to people I have hurt. <i>(reverse scored)</i> 27. I always try to respect other people's views, even when I don't agree with them. 45. I have trouble expressing affection or love for other people. <i>(reverse scored)</i> 59. I have at least one person I can always trust and rely on. 61. I work hard to maintain my friendships. 65. I always try to make time for friendly interactions with other people. 78. I praise and encourage other people far more often than I criticize them.
References: 46,106,108,109,130
4. Manages Emotions Constructively:
Can identify his or her positive and negative emotions; regulates his or her impulses and nurtures his or her positive emotions and attitudes; expresses his or her emotions when appropriate; pays attention to the emotions of others.
Corresponding scored items:
2. I know how to identify my emotions accurately, both positive and negative ones. 4. I often bottle up my emotions. <i>(reverse scored)</i> 9. I'm good at judging how other people are feeling. 16. I often think about good things that happened to me to make me feel happy. 39. I sometimes make myself smile when I feel sad. 62. I have trouble controlling my negative emotions, like sadness, fear, or anger. <i>(reverse scored)</i> 63. I sometimes get emotional when I shouldn't. <i>(reverse scored)</i> 76. I'm good at keeping myself calm in difficult situations.
References: 111,110,131,132
5. Manages Stress Effectively:
Practices breathing techniques, visualization techniques, and other relaxation techniques; plans ahead, prioritizes, and takes breaks to make sure that stress doesn't overwhelm him or her; uses humor to reduce stress.
Corresponding scored items:
10. I practice yoga, meditation, or other relaxation techniques to help me relax. 47. I often try to use humor to reduce tension. 49. I have trouble prioritizing. <i>(reverse scored)</i> 55. I regularly take breaks to help me relax. 58. When I start to panic, I know how to calm myself down. 69. I frequently visualize soothing scenes to help me relax. 71. I generally plan ahead as a way of reducing the chaos in my life. 73. I generally try to avoid or ignore hostile people.
References: 11,113,130,133–136
6. Manages Thoughts Constructively:
Frames and reframes his or her thinking in the most optimistic way possible; identifies his or her faulty beliefs and adopts accurate ones; identifies and expresses gratitude for positive things in his or her life; stays in the moment and avoids overthinking about the past or the future.
Corresponding scored items:
Continued

<p>3. I'm good at staying in the moment, rather than worrying about the past or future. 6. I regularly examine and try to correct my irrational beliefs. 11. When something bad happens to me, I try to think about it in a neutral or positive way. 13. I always have high hopes for the future. 19. My negative thoughts often overwhelm me. <i>(reverse scored)</i> 24. I generally have realistic expectations about what's going to happen. 75. I often take the time to think about things I'm grateful for. 77. I generally look at the positive side of things.</p>
<p>References: 46,108,114–116,124,129,137</p>
<p>7. Practices Assertiveness:</p>
<p>Stands up for his or her needs and views without offending or hurting others; avoids passiveness and aggressiveness in most situations; maintains good posture, eye contact, tone, and volume when talking to others.</p>
<p>Corresponding scored items:</p>
<p>5. When I don't understand what someone is saying, I always ask him or her to clarify. 17. I always try to speak loudly enough so people can hear me easily. 23. I know how to voice my opinions without hurting others. 26. I maintain good eye contact when speaking with people. 35. When I need to ask someone for a favor, I always ask for it clearly and directly. 40. I always speak up when something is bothering me. 66. I have no trouble saying no to people. 81. When I'm blamed for something I didn't do, I always speak up and defend myself.</p>
<p>References: 117–120,127</p>
<p>8. Seeks to Grow and Improve:</p>
<p>Identifies his or her strengths and weaknesses; uses strengths to his or her advantage; seeks continual self-improvement after both positive and negative experiences; seeks to perform to the best of his or her ability; sets ambitious but realistic goals and works hard to achieve those goals.</p>
<p>Corresponding scored items:</p>
<p>1. I'm good at identifying my strengths and weaknesses. 20. I see challenges as opportunities to improve myself. 30. I regularly explore ways to improve myself. 34. I use both positive and negative life experiences to grow and improve myself. 37. I regularly review the goals I've set for myself. 38. I regularly set ambitious but realistic goals for myself. 48. I always seek to perform at a high level. 72. I generally work hard to achieve my goals.</p>
<p>References: 11,40,42,100,138</p>
<p>9. Solves Problems Effectively:</p>
<p>Employs multiple methods for solving problems; tries new approaches when one approach doesn't work; refrains from denying or avoiding his or her problems; stays calm and clearheaded when faced with problems.</p>
<p>Corresponding scored items:</p>
<p>14. I'm always looking for the best possible solution to every problem I face. 29. I have trouble thinking clearly when I'm faced with problems. <i>(reverse scored)</i> 33. I often find myself repeating the same mistakes. <i>(reverse scored)</i> 51. When I can't solve a problem, I often ask other people to help me. 68. I often find creative new ways to solve my problems. 70. I often wish my problems would just go away. <i>(reverse scored)</i> 79. When I can't solve a problem one way, I try another. 80. I often avoid dealing with the problems I face in my life. <i>(reverse scored)</i></p>
<p>References: 46,121,122,139</p>

Table 1. Nine resilience competencies.

can all be viewed in Table 1. Because a great deal of time has passed since we first posted the questionnaire, we have included some newer references in Table 1, along with the original references. Because of the long time frame of the study, we will also look for temporal trends in our data.

As you read through the descriptions of each competency below, please note that the items on the new questionnaire—the Epstein Resilience Inventory (ERI)—generally pinpoint specific behaviors or items of knowledge. For example, Item 7 refers to specific kinds of thoughts rather than referring to a trait such as “optimism”: *I try not to think too much about bad things that have happened to me.* Item 17 refers to the volume of someone's speech, rather than referring to a trait such as “assertiveness”: *I always try to speak loudly enough so people can hear me easily.* Item 38 asks about the frequency of goal setting, rather than referring to a trait such as “motivation”: *I regularly set ambitious but realistic goals for myself.*

Competency 1: Copes effectively with past traumas

A US study that evaluated 205 individuals several years before the loss of their spouse and 6–18 months after that time found that resilient people showed significantly lower levels of depression, had more positive world views, and had more support from family and friends¹⁰⁰. Language from this study helped us to develop items for the ERI, such as *I always try to find meaning in the bad things that have happened to me* (Item 57) and *I often turn to friends or relatives to help me deal with bad experiences* (Item 50). Studies that looked at the most effective coping strategies used by resilient people also helped us to develop this competency and its items^{23,101–103}.

Competency 2: develops mental and physical toughness

A study that evaluated 10 of the world's top professional athletes in 2002 found that attributes of mental toughness, such as unshakable self-confidence, persistence after failure, and maintaining focus, were associated with resilience to face the challenges of their sport¹⁰⁴. Other studies on athletes and military personnel have found that individuals who have attributes of mental toughness perform better under extreme pressure than those who don't^{46,105–107}. At least five of the items in this competency area were developed using language from these and related studies, including Item 15 (*I'm aware of and take pride in my strengths*), Item 22 (*I never let my fears hold me back*), Item 32 (*I often get upset or angry when I'm criticized* [reversed scored]), Item 42 (*I always finish what I start*), and Item 67 (*When the going gets tough, I frequently just give up* [reversed scored]).

Competency 3: maintains advantageous relationships

A literature review on personal resilience published in 2007 found that “building positive and nurturing” relationships was one effective strategy for improving one's ability to face adversity¹⁰⁸. A 2015 report on “resilience in development” found that maintaining positive relationships was a central feature of resilience and a strong protective factor against vulnerability¹⁰⁹. Findings from these review articles and other empirical studies were used to create items such as: *I have at least one person I can always trust and rely on* (Item 59), *I work hard to maintain my friendships* (Item 61), and *I always try to make time for friendly interactions with other people* (Item 65).

Competency 4: manages emotions constructively

A 2007 review of empirical studies on emotional regulation strategies described “cultivating positive emotions” as a key strategy for building resilience to stressful events¹¹⁰. A 2006 study with 67 undergraduates at the University of Missouri found that the repetition of two mental exercises that asked the participants to think of what they were grateful for and to visualize their best possible self, increased positive emotions¹¹¹. Findings from this study were used to develop some of the items for competency four, including Item 16 (*I often think about good things that happened to me to make me feel happy*). Language from the military resilience training program MRT (mentioned above), which includes training on emotional awareness as part of its curriculum¹¹², helped us to develop the following test items: *I know how to identify my emotions accurately, both positive and negative ones* (Item 2), *I'm good at judging how other people are feeling* (Item 9), and *I have trouble controlling my negative emotions, like sadness, fear, or anger* (Item 62 [reversed scored]).

Competency 5: manages stress effectively

A 2010 study of 48 employees at a British university found that a six-week yoga course significantly improved the participants' self-reported mood and well-being, as well as their self-confidence and resilience to stress¹¹³. Findings from this study and similar empirical studies were used to develop multiple items for competency five, including Item 10 (*I practice yoga, meditation, or other relaxation techniques to help me relax*), Item 55 (*I regularly take breaks to help me relax*), and Item 69 (*I frequently visualize soothing scenes to help me relax*).

Competency 6: manages thoughts constructively

Multiple studies have found good outcomes for individuals who practice behaviors such as positive reframing and the expression of gratitude and optimism^{46,114–116}. We used the findings from these and related studies to develop several items for our Manages Thoughts Constructively competency. These items include Item 11 (*When something bad happens to me, I try to think about it in a neutral or positive way*), Item 19 (*My negative thoughts often overwhelm me* [reverse scored]), Item 75 (*I often take the time to think about things I'm grateful for*), and Item 77 (*I generally look at the positive side of things*).

Competency 7: practices assertiveness

Multiple studies have shown that assertiveness training can help improve mental resilience, particularly in adolescents^{117,118}. Language from these and related studies helped us to develop multiple items for this competency, such as: *I know how to voice my opinions without hurting others* (Item 23), *I always speak up when something is bothering me* (Item 40), and *I have no trouble saying no to people* (Item 66). Newer studies that evaluate the value of assertiveness training for improving resilience also support the value of this competency^{119,120}.

Competency 8: seeks to grow and improve

A 2004 review of empirical studies that examined characteristics of resilience that allow people to thrive after loss and trauma found that self-enhancement behaviors, as well as a belief in one's ability to grow from both positive and negative life experiences, can help people to avoid negative outcomes from extreme stress and to adapt after the loss of a loved one¹¹. Language from this review and related studies helped us to develop some of the items in competency eight, including Item 20 (*I see challenges as opportunities to improve myself*), Item 34 (*I use both positive and negative life experiences to grow and improve myself*), and Item 48 (*I always seek to perform at a high level*). Newer studies have also examined how cultivating a “growth mindset” can help improve resilience^{40,42}.

Competency 9: solves problems effectively

A study that trained 621 US veterans on problem-solving techniques found significant increases in the participants' post-training resilience scores¹²¹. This finding is consistent with newer studies on the relationship between problem-solving training and resilience¹²². Language from the study on veterans and similar empirical studies were used to develop the Solves Problems Effectively competency and its items, including Item 51 (*When I can't solve a problem, I often ask other people to help me*), Item 79 (*When I can't solve a problem one way, I try another*), and Item 80 (*I often avoid dealing with the problems I face in my life* [reverse scored]).

The present study

Below, we will describe a study in which we analyzed data obtained from a diverse group of 5279 people with several aims in mind: to measure aspects of the reliability and validity of the ERI, to rank-order the nine competencies measured by the ERI according to how well they predicted answers to eight criterion questions we asked our participants, to measure demographic effects, and to assess the possible value of resilience training.

Methods

Participants

Our data were collected online between March 11, 2016, and January 14, 2024. The ERI was directly accessible at <https://HowResilientAreYou.org/>, and we had no control over whether that link was posted on other websites. Our sample should therefore be considered a convenience sample; such samples have been found to be adequate and informative in a variety of different studies¹⁴⁰; we will revisit this issue in our Discussion section.

Before cleaning, we had gathered data from 5931 people in 107 countries. In the cleaning process, we eliminated (a) people who reported their English fluency as a value below 6 on a 10-point scale, where 1 was labeled “Not fluent” and 10 was labeled “Highly fluent,” (b) people who completed the questionnaire more than once on the same day (in which case we retained only the first session in which they completed at least half the items), and (c) sessions in which people answered fewer than half the items. After cleaning, we had a total of 5279 participants in 104 countries.

Our sample included 2966 (56.2%) people who identified themselves as female, 2160 (40.9%) as male, and 153 (2.9%) as other. The mean reported age was 29.1 ($SD=13.8$, median = 25). Participants identified their race/ethnicity as follows: Asian ($n=1097$, 20.8%), Black ($n=204$, 3.9%), Hispanic ($n=293$, 5.6%), Native American ($n=42$, 0.8%), Other ($n=388$, 7.3%), White ($n=3255$, 61.7%). Participants identified the educational level they completed as follows: no high school ($n=701$, 13.3%), high school ($n=1645$, 31.2%), associates or 2-year college degree ($n=370$, 7.0%), 4-year college degree ($n=1836$, 34.8%), master’s degree ($n=565$, 10.7%), doctoral degree ($n=162$, 3.1%). Participants identified their sexual orientation as follows: bisexual ($n=767$, 14.5%), gay/lesbian ($n=394$, 7.5%), no response ($n=172$, 3.3%), other ($n=281$, 5.3%), straight ($n=3035$, 57.5%), unsure ($n=630$, 11.9%). 2468 (46.8%) of participants said they were employed, 2256 (42.7%) said they were unemployed, and 555 (10.5%) did not answer this question.

Measures

The present study introduces a new, competencies-based test of resilience called the *Epstein Resilience Inventory* (ERI), which was first posted online in 2016 at https://HowResilientAreYou.org. As we noted earlier, the items on this test were all derived from peer-reviewed studies that show a positive association between resilience and nine different competencies that are both measurable and trainable (Table 1).

Procedure

We began the process of validating this new inventory by looking for correlations between test scores and participants’ answers to eight different criterion questions, as follows:

1. Are you currently in therapy?
2. Have you ever been diagnosed with a mental illness?
3. Have you ever been hospitalized for a mental health problem?
4. Have you ever been in therapy?
5. In general, how happy and fulfilled are you?
6. In general, how much success have you had in your professional life?
7. In general, how much success have you had lately in your personal life?
8. In general, how resilient do you consider yourself to be?

Note that the first four questions are dichotomous variables. The last four are continuous variables, answered on a 10-point Likert scale.

Presumably, the stronger the association between our test scores and people’s answers to these questions, the more valid the test. This type of validation procedure is described in the most recent edition of *Standards for Educational and Psychological Testing*, prepared jointly by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education¹⁴¹. The design that relies on this type of validation is called a “concurrent study design,” because the responses on the questionnaire are collected at the same time various criterion questions are asked; this avoids possible temporal confounds when criterion data are collected at a later time.

We also used regression analysis to determine which of the competencies best predicted people’s answers to our eight criterion questions. We also looked at demographic differences in people’s scores, and, finally, we measured the extent to which resilience training might be beneficial.

Ethics statement

The federally registered Institutional Review Board (IRB) of the sponsoring institution (American Institute for Behavioral Research and Technology) approved this study (protocol number 9003) with exempt status and a waiver of the requirement for informed consent under the U.S. Department of Health and Human Services (HHS) regulations (45 CFR 46.116(d), 45 CFR 46.117(c)(2), and 45 CFR 46.111) because (a) the anonymity of participants was preserved and (b) the risk to participants was minimal. All methods were carried out in accordance with relevant guidelines and regulations. The IRB is registered with the Office for Human Research

Protections (OHRP) under number IRB00009303, and the Federalwide Assurance number for the IRB is FWA00021545.

Results

Reliability evidence

We found high values of internal consistency reliability using Cronbach's alpha (0.95) and the Guttman split-half test (0.94). Because our test was administered over the internet and because we were required by our IRB to protect the anonymity of our participants, we were not able to retest participants and thus could not calculate test-retest reliability. Cronbach's alpha values for each of the nine competencies, in descending order, were as follows: Seeks to Grow and Improve, 0.84; Manages Thoughts Constructively, 0.78; Solves Problems Effectively, 0.77; Develops Mental and Physical Toughness, 0.75; Practices Assertiveness, 0.74; Maintains Advantageous Relationships, 0.71; Manages Emotions Constructively, 0.70; Manages Stress Effectively, 0.60; and Copes Effectively with Past Traumas, 0.56.

Validity evidence

Total scores were correlated with all eight of our criterion variables in a predictable direction (positively or negatively), listed here from highest to lowest correlations: participants' self-reported levels of happiness ($r = 0.62$, $p < 0.001$), resilience ($r = 0.61$, $p < 0.001$), personal success ($r = 0.56$, $p < 0.001$), professional success ($r = 0.46$, $p < 0.001$), ever been diagnosed with a mental illness ($r = -0.15$, $p < 0.001$), currently in therapy ($r = -0.07$, $p < 0.001$), ever been hospitalized for a mental health problem ($r = -0.05$, $p < 0.001$), and ever been in therapy ($r = -0.04$, $p = 0.002$). (Note that the latter four variables are dichotomous, as we stated earlier. Correlations for such variables tend to be small¹⁴². Corrections for correlations with dichotomous variables have been proposed^{143,144} but have not been widely adopted). We did not evaluate face validity because our items and competencies were all derived from empirical studies (see Introduction and Table 1); it could be argued that deriving our content in that way is at least as valid a method of determining face validity as more conventional methods, such as by having experts rate the content¹⁴⁵. Also, because we were required by our IRB to protect the anonymity of our participants, we could not assess convergent or discriminant validity.

Although not specifically predicted, the validity of the measuring instrument is also suggested by the fact that the mean total score for those who reported having had resilience training was significantly higher than the mean total score for those who did not ($M_{Yes} = 67.5$ [14.4], $M_{No} = 60.5$ [14.5], $t = 8.82$, $p < 0.001$, Cohen's $d = 0.48$). Overall questionnaire scores were also found to be marginally significantly correlated with the number of hours of resilience training participants reported ($r = 0.12$, $p = 0.04$).

Total scores

The overall mean total score was 61.0 ($SD = 14.6$), and subscale means were as follows, in descending order: Manages Advantageous Relationships ($M = 72.9$ [16.4]), Seeks to Grow and Improve ($M = 67.2$ [20.2]), Practices Assertiveness ($M = 63.4$ [18.6]), Copes Effectively with Past Traumas ($M = 61.6$ [16.6]), Manages Thoughts Constructively ($M = 59.5$ [20.4]), Manages Stress Effectively ($M = 59.1$ [16.6]), Solves Problems Effectively ($M = 59.1$ [18.7]), Manages Emotions Constructively ($M = 55.5$ [18.3]), and Develops Mental and Physical Toughness ($M = 51.2$ [19.5]). (Note: For readability, we will always report test scores as percentages rather than raw scores.)

Regression analyses

Linear regression was used to determine which competencies were most strongly associated with answers to our eight criterion questions (listed in the "measures" section of Methods, above). Remarkably, even though the ERI measures nine different competencies, a single competency—Manages Thoughts Constructively—proved to be the best predictor of six of our eight criterion variables. Specifically, when we conducted binary logistic regressions with our four dichotomous clinical criterion variables, the competency Manages Thoughts Constructively proved to be the best predictor of three of the four of these dichotomous variables (Table 2). And when we conducted standard linear regressions with our four continuous life-quality criterion variables, the competency Manages Thoughts Constructively again proved to be the best predictor of three of the four of these continuous variables (Table 3). When we used linear regression to compare all eight criterion variables in the same model (which is inappropriate, we believe, because dichotomous and continuous variables are not directly comparable), Manages Thoughts Constructively proved to be the best predictor of seven of the eight criterion variables (see Table S2 in our Supplementary Materials).

Criterion variable	Best predictor variable among the nine competencies	β	Wald	r^2
Currently in therapy	Manages Thoughts Constructively	-0.11***	88.25	0.09
Ever been diagnosed with a mental illness	Manages Thoughts Constructively	-0.08***	76.81	0.08
Ever been in therapy	Manages Thoughts Constructively	-0.08***	91.40	0.05
Ever been hospitalized for a mental health problem	Develops Toughness	-0.05***	15.06	0.03

Table 2. Binary logistic regression results showing how well the most predictive competencies predicted answers to our four clinical criterion questions (in descending order by absolute beta value).*** $p < 0.001$.

Criterion variable	Best predictor variable among the nine competencies	β	t	r^2
Happiness	Manages Thoughts Constructively	0.23***	59.67	0.40
Resilience level	Manages Thoughts Constructively	0.20***	50.82	0.33
Personal success	Manages Thoughts Constructively	0.19***	45.14	0.28
Professional success	Seeks to Grow and Improve	0.17***	34.51	0.19

Table 3. Linear regression results showing how well the most predictive competencies predicted answers to our four life-quality criterion questions (in descending order by beta value)*** $p < 0.001$.

Demographic analyses

We found a significant but small effect for gender ($M_{female} = 61.0$ [14.6], $M_{male} = 61.5$ [14.5], $M_{other} = 54.2$ [15.6], $F = 18.14$, $p < 0.001$, $\eta^2 = 0.007$), and no significant male/female difference ($t = 1.38$, $p = 0.17$ NS, $d = 0.03$). (Note that because this is a large-n study, statistical significance is not necessarily a good indicator of the importance of mean differences. For this reason, we also have included two different measures of effect size: Cohen's d , where we are comparing two means, and eta-squared, where we are comparing three or more means¹⁴⁶.) We also found a significant but small effect for race/ethnicity, with respondents identifying themselves as Native American outscoring all other ethnicities ($M_{Asian} = 63.9$ [13.9], $M_{Black} = 58.2$ [15.4], $M_{Hispanic} = 60.8$ [13.7], $M_{NativeAmerican} = 69.8$ [19.0], $M_{Other} = 60.7$ [14.3], $M_{White} = 60.2$ [14.7]; $F = 15.49$, $p < 0.001$, $\eta^2 = 0.01$; Native American vs. non-Native American: $M_{NativeAmerican} = 69.8$ [19.0], $M_{NonNativeAmerican} = 60.9$ [14.6], $t = 3.03$, $p = 0.004$, $d = 0.53$), a finding that seems inconsistent with studies that find a relatively high prevalence of mental health problems among Native Americans^{147,148}. (We note that our finding here may be an artifact of a relatively small sample size for Native Americans: $n = 42$.)

We also found a significant effect for sexual orientation, with self-labeled straights outscoring gays/lesbians and bisexuals ($M_{bisexual} = 59.0$ [14.6], $M_{gay/lesbian} = 58.5$ [15.0], $M_{straight} = 63.6$ [14.0], $M_{other} = 57.0$ [15.4], $M_{unsure} = 54.1$ [13.7], $F = 74.79$, $p < 0.001$, $\eta^2 = 0.06$; straight vs. non-straight: $M_{Straight} = 63.6$ [14.0], $M_{NonStraight} = 58.5$ [14.9]; $t = 10.92$, $p < 0.001$, $d = 0.35$).

Participants from the US and Canada combined scored significantly higher than participants from other regions, but both the mean difference (1.2) and the effect size were small ($M_{US/Canada} = 61.6$ [14.6], $M_{Other} = 60.4$ [14.7], $t = 3.01$, $p = 0.003$, $d = 0.08$).

We also found an effect for education level, with higher levels of education completed associated with higher scores on the questionnaire ($M_{None} = 54.7$ [14.4], $M_{Highschool} = 57.3$ [14.2], $M_{Associates} = 62.6$ [14.4], $M_{Bachelors} = 64.3$ [13.6], $M_{Masters} = 65.9$ [13.7], $M_{Doctorate} = 68.3$ [14.4]; $F = 95.98$, $p < 0.001$, $\eta^2 = 0.08$). Mean test scores were also higher for participants who reported having been married ($M_{Yes} = 66.7$ [13.5], $M_{No} = 58.7$ [14.4], $t = 18.81$, $p < 0.001$, $d = 0.57$).

Age proved to be moderately associated with questionnaire scores, with higher ages associated with higher scores ($r = 0.28$, $p < 0.001$). Moreover, participants ages 18 and older scored significantly higher than minors ($M_{18-95} = 62.5$ [14.4], $M_{11-17} = 55.2$ [14.2]; $t = -14.84$, $p < 0.001$, $d = 0.51$). We also found significant effects for both parental status ($M_{Parent} = 66.0$ [13.9], $M_{Nonparent} = 59.0$ [14.5], $t = -15.77$, $p < 0.001$, $d = 0.49$) and employment status ($M_{Employed} = 64.6$ [13.9], $M_{Unemployed} = 57.0$ [14.5], $t = 18.53$, $p < 0.001$, $d = 0.54$). See Table S1 for additional demographic breakdowns. We believe it is beyond the scope of the present paper to speculate about why demographic differences in resilience exist, but we note that this issue has been discussed in some detail by other authors¹⁴⁹⁻¹⁵¹.

Year-by-year analysis

As we noted earlier, our data were collected over a period of more than 7 years, and we had complete data for the 7 years from 2017 to 2023. Over this period, we found a linear trend in the mean total scores—a small annual increase ($p < 0.001$, $r^2 = 0.006$, $\beta = 0.077$, $t = 4.86$). This trend is consistent with the difference we found between the mean total score before the midpoint of the study (February 18, 2020) and mean total score after the midpoint of the study; the latter was significantly larger than the former ($M_{BeforeMidPoint} = 59.5$ [14.4], $M_{AfterMidPoint} = 64.2$ [14.5], $t = -10.88$, $p < 0.001$, $d = 0.33$). We speculate that the increase might have been related to the dramatic spread of COVID-19 which began in early 2020^{152,153}. For a further breakdown of changes in specific competencies over the course of the study, see Table S3.

Discussion

Main findings and conclusions

Our results provide evidence of both the validity and reliability of the ERI, and they also allowed us to rank-order our nine competencies according to how well they predicted desirable clinical and life outcomes (all self-reported). The main finding, which we had not anticipated, was that the best predictor of both desirable clinical and life outcomes was the competency we labeled Manages Thoughts Constructively. This finding is consistent with the findings of a recent experimental study in which training in positive thinking proved to be beneficial in strengthening resilience among older adults^{43,88,154}. Thought management has also been shown to be valuable in overcoming life's difficulties⁴³, as well as in improving psychological well-being in the elderly¹⁵⁵. Neuroticism, or the tendency toward negative emotions, has also been found to be negatively correlated with resilience¹⁵⁶.

Unfortunately, our participants did not score highly on the Manages Thoughts Constructively competency. Their mean score on this competency was only 59.5. They scored higher on four other competencies, scoring highest on Manages Advantageous Relationships ($M = 72.9$). Given the strong predictive value of Manages

Thoughts Constructive (again, we imply no causal relationship here), resilience training programs might produce better outcomes if they put more emphasis on training this competency. Currently, such emphasis is lacking. In an overview of available programs, some military programs included training on optimism and mental agility³¹. We also found a program for the elderly that trained positive thinking as a way of improving resilience but that did not train other competencies⁴³. Most of the programs we reviewed did not train constructive thought management at all^{32,35,39,44}.

Our study also suggested the value of resilience training. Participants who reported having received such training scored significantly higher on the ERI than people who had had no such training ($p < 0.001$), and test scores were marginally positively correlated with the number of training hours people reported. This is consistent with our findings that scores on the ERI increased with age ($r = 0.28, p < 0.001$) and with our findings that scores on the ERI increased with educational level completed ($F = 95.98, p < 0.001$). All three of these findings remind us that although resilience likely has a genetic component¹⁵⁷, learning plays an important role in its development; hence the importance and value of the competencies approach.

The learning component might also help us account for the fact that the mean score on the ERI prior to the midpoint of our study (February 18, 2020) was significantly lower than the mean score after that date. We can only speculate on this issue, but it is possible that the stressors introduced worldwide during the COVID-19 pandemic (which began in early 2020) might have challenged people into improving or expressing their resilience^{158–160}.

Limitations and future research

We believe that this study supports some important and fresh conclusions about resilience, but we are also aware of its limitations. Its main limitation, we believe, is that our data were obtained from an online convenience sample. Although this sample was large and diverse (5279 English-language speakers from 104 countries), we had no control over the sampling, and it is possible that an online resilience questionnaire will attract the attention of people who are not representative of the general population. This is not a trivial issue. People who seek out and then complete a questionnaire about stress management are probably having trouble managing stress in their lives⁸⁸. What kinds of people will seek out and complete an online questionnaire about resilience? Where, in fact, would most people even have an opportunity to learn about resilience? Over the past 20 years, Google Trends (<https://trends.google.com>), which tracks the popularity of search terms, has shown interest in the search term “depression” to vary between roughly 65% and 100% for US users; whereas, over that same period, interest in the search term “resilience” has varied between 0% and roughly 10% for US users. “Resilience” is of interest to relatively few people, it seems—at least in the US.

The present study was not designed to give us any insights about such issues. Because nearly half (47.7%) of our participants were from the US, we compared the demographic characteristics of our US sample with characteristics from the latest US census¹⁶¹. Our sample differed from census data mainly in five respects: We had a significantly higher proportion of females (56.2% in our study vs. 50.5% in the US, $z = 5.72, p < 0.001$), a significantly smaller proportion of Blacks (5.4% in our study vs. 13.7% in the US, $z = -12.11, p < 0.001$), a significantly higher proportion of Asians (7.7% in our study vs. 6.4% in the US, $z = 2.66, p = 0.008$), and a significantly smaller proportion of Hispanics (7.5% in our study vs. 19.5% in the US, $z = -15.20, p < 0.001$). We found the largest discrepancy in education—a substantially higher proportion of people who had completed at least four years of college (73.8% in our study vs. 35.0% in the US, $z = 40.81, p < 0.001$).

Using post-stratification and weights from the most recent US census data—scaled to gender, ethnicity, and education—we recalculated the correlations between total ERI scores and our eight criterion variables^{162,163}. We did so using the Python IPFN (Iterative Proportional Fitting with N Dimensions) package. Seven of our criterion variables were still significantly correlated with total scores on the ERI after the post-stratification: happiness ($r = 0.60, p < 0.001$), resilience ($r = 0.61, p < 0.001$), personal success ($r = 0.55, p < 0.001$), professional success ($r = 0.44, p < 0.001$), ever been diagnosed with a mental illness ($r = -0.13, p < 0.001$), currently in therapy ($r = -0.05, p = 0.01$), and ever been hospitalized for a mental health problem ($r = -0.04, p = 0.04$). The criterion variable “ever been in therapy” was not significantly correlated with total score on the ERI after post-stratification ($r = -0.01, p = 0.52$).

These demographic differences do not necessarily give us any useful information, however, about why our questionnaire might have attracted users with special concerns about or interest in resilience. Sampling issues need to be explored in future investigations, perhaps by adding other questions to the demographic questions—simple questions, perhaps, such as, “Why are you completing this questionnaire?”

Another way we could at least glimpse potentially important characteristics of our sample was to look at answers people gave to our criterion questions, once again comparing those answers to actual clinical data, where available. For example, 55.6% of our participants in the US indicated that they had been in therapy at some point, and 17.4% (US) said they were currently in therapy. According to the 2022 National Survey on Drug Use and Health¹⁶⁴, “In 2022, 29.8% of adolescents aged 12 to 17... received mental health treatment in the past year” compared with “21.8% of adults aged 18 or older.” These percentages are not directly comparable, but they suggest that the ERI might have attracted people with more mental health problems than the typical American.

We saw the same pattern in happiness. The mean happiness score for our US participants was 5.75; whereas, according to the 2024 World Happiness Report (for the years 2021 to 2023), the mean happiness score for the US was 6.7¹⁶⁵ ($t = -28.96, p < 0.001$). Could it be that the ERI attracted relatively unhappy, mentally ill Americans? Once again, these are just demographic characteristics; they don’t tell us why the people in our convenience sample chose to complete an online questionnaire on resilience. They do suggest, however, that our participants might differ from the general population in nontrivial ways.

Although we cannot give (at least to our satisfaction) a clear answer to why our participants were drawn to the ERI, we do know that convenience samples have value^{140,166}. We suggest that our large and diverse sample is

certainly more informative than the traditional social science study conducted with a few hundred students at a single college or university^{167,168}.

We note that for two of our competencies (“Manages Stress Effectively” and “Copes Effectively with Past Traumas”), the Cronbach’s alpha values (0.60 and 0.56, respectively) fell below the conventional threshold for acceptable reliability, which is 0.70¹⁶⁹. These low values might have undermined the validity of analyses in which we compared the competencies, such as our in our regression analyses. The values for the other seven competencies were in the range 0.70 to 0.84, and the overall alpha was 0.95.

Because we were required by our IRB to protect the anonymity of our participants, we also could not conduct any kind of follow-up procedures with them, which ruled out evaluating some traditional measures of validity and reliability (such as convergent validity or test-retest reliability). In an ideal follow-up study, we would measure intervention sensitivity by looking for evidence that resilience increased after people underwent resilience training that raised their scores on the ERI. In the present study, we used three kinds of indirect evidence that allowed us to speculate about the benefits of resilience training: (1) We found that scores on the ERI were positively and significantly correlated with three positive life outcomes (as measured by people’s responses to our criterion questions). (2) We found that the mean scores of people who reported having had resilience training were significantly higher than the mean scores of people who did not report having such training. (3) And we found that tests scores were positively and significantly correlated (at least marginally so) with the number of reported training hours. We note also that all of our criterion data were self-reported; we had no independent measures to confirm the accuracy of these self reports. We also did not have enough data from countries outside the US to conduct comparative analyses across countries. All of these deficiencies can be addressed in future studies.

Finally, we note that the present study is correlational in design. It allowed us to find the strength of relationships between variables (for example, the strong association between the competency Manages Thoughts Constructively and answers to most of our criterion questions), but we can say nothing about causal relationships between any of the variables we examined. We have no basis, in other words, for claiming that training people to manage their thoughts more effectively will enhance resilience. As noted above, future research could use an experimental design to test for the effectiveness of improving resilience by training relevant competencies.

Data availability

An anonymized version of the data can be accessed at <https://doi.org/10.5281/zenodo.17781953>. Data can also be requested from the American Institute for Behavioral Research and Technology [info@aibr.org]. The data have been anonymized to comply with the requirements of the sponsoring institution’s Institutional Review Board (IRB).

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Author contributions

R.E. conceived of and designed the study, supervised data collection, and drafted the manuscript; S.G. and N.W. analyzed data and helped to prepare the manuscript; A.N. supervised the manuscript revision. All authors read and approved the final manuscript.

Declarations

Competing interests

The authors declare no competing interests.

Additional information

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