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Initial Validation of the U.S. Army Global Assessment Tool

Loryana L. Vie and Lawrence M. Scheier
University of Pennsylvania

Paul B. Lester
Research Facilitation Laboratory, Monterey, California

Martin E. P. Seligman
University of Pennsylvania

The U.S. Army developed the Global Assessment Tool (GAT) to monitor psychosocial fitness and well-being among soldiers and provide a means to objectively gauge the success of newly implemented resilience training programs. Despite its widespread use (taken over 5.2 million times) and stated utility for program evaluation, there is relatively little published evidence regarding the GAT's reliability and validity. We used exploratory structural equation modeling (ESEM) with 4 random samples of soldiers (n = 10,000 each) to examine the factorial validity and reliability of the GAT. An 11-factor solution (Self-Management, Positive Affect, Meaning, Work Engagement, Organizational Trust, Loneliness, Negative Cognitions, Hostility, Negative Emotions, Depressive Symptoms, and Emotion-Focused Coping), with 4 additional factors assessing character strengths (Intellect, Warmth, Civic Strengths, and Temperance), fit well and replicated in a second random sample. A higher order, 2-factor model using composites scores and positing positive and negative psychosocial competencies also fit well. Tests of measurement invariance using a third random sample reinforced consistent measurement properties across gender, age, and rank, with the exception of character strengths, which produced different factor structures for males and females. Further validity tests using a fourth random sample underscored a modicum of divergence among the resilience factors and convergence among the character strengths factors. We conclude with recommendations for enhancing and refining the GAT and discuss the GAT's utility as a reliable, multidimensional psychosocial assessment that can be used to evaluate the efficacy of military resilience training programs.

Keywords: Global Assessment Tool, psychometric structure, factorial invariance, psychosocial functioning, military

Following prolonged engagement in both Operation Iraqi Freedom and Operation Enduring Freedom, the U.S. Army (hereafter, "Army") has experienced an unprecedented increase in rates of depression, posttraumatic stress disorder (PTSD), and alcohol use disorders among service members (e.g., Hoge, Auchterlonie, & Milliken, 2006; Milliken, Auchterlonie, & Hoge, 2007; Seal, Bertenthal, Miner, Sen, & Marmar, 2007). In response to the dramatic surge in mental health problems following deployment, the Army created Comprehen-

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Loryana L. Vie and Lawrence M. Scheier, Department of Psychology, University of Pennsylvania; Paul B. Lester, Research Facilitation Laboratory, Army Analytics Group, Monterey, California; Martin E. P. Seligman, Department of Psychology, University of Pennsylvania.

Lawrence M. Scheier is now at LARS Research Institute, Inc., Scottsdale, Arizona.

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Correspondence concerning this article should be addressed to Loryana L. Vie, 20 Ryan Ranch Road, Suite 170, Monterey, CA 93940. E-mail: lvie@sas.upenn.edu

sive Soldier & Family Fitness (CSF2), an organization tasked with developing and delivering a full slate of universal prevention strategies to boost soldier resilience and bolster skills that could offset soldiers' vulnerability to stress (Headquarters, Department of the Army, 2014; McHugh, 2013). This effort was redoubled by the Department of Defense, which required all branches of the armed forces to identify effective ways to reduce vulnerability to stress (Department of Defense, 2011).

Coinciding with demands for efficacious prevention interventions, Army leadership recognized the need for a valid and reliable set of resilience metrics that could monitor the pulse of soldier psychosocial fitness and well-being (e.g., Cornum, Matthews, & Seligman, 2011). Existing measures routinely implemented in military science, such as the Connor-Davidson Resilience Scale (Connor & Davidson, 2003), were deemed either too narrow in scope for the needs of the CSF2 program or were not theoretically consonant with the goals of CSF2 (e.g., Bartone, Roland, Picano, & Williams, 2008; Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009). In a recent review of CFS2 goals and objectives, Lester, Harms, Herian, and Sowden (2015) noted the following:

> Both Army leadership and the GAT developers wanted to take a broader view of fitness and instead measure multiple factors related to psychosocial fitness that, if already present or more aptly if trained, would best prepare a soldier to demonstrate resilience in the face of adversity. (p. 4)

Consequently, through an iterative process, the Army developed the Global Assessment Tool (GAT), a self-report and self-awareness tool designed to assess the psychosocial fitness of Army soldiers.[1]

The GAT was developed by an expert committee with input from academia, the military, and the private sector. The Army tasked the committee with developing a self-assessment tool, guided by the principles of positive psychology, which would take no more than 15 min, contain reliable subscales, and offer a multifaceted assessment of resilience (Lester et al., 2015; Peterson, Park, & Castro, 2011). Over 90% of the resulting 105 items were adapted from well-validated and published scales. Soldiers take the GAT at least once annually and receive self-awareness feedback through an online information technology platform (Fravell, Nasser, & Cornum, 2011). Lester et al. (2015) and Peterson et al. (2011) provide a more complete history of the GAT development process.

Theoretical Foundations of the GAT

The CSF2 program highlights the role of resilience as a capacity (something that can be enhanced through programmatic interventions) more so than a trait (e.g., something stable) or process (e.g., adapting to one's environment; Kossek & Perrigino, 2016). Framed by positive psychology, the GAT was intended to assess the "valued subjective experiences," "positive individual traits," and "civic virtues" that help people flourish in their normal daily activities (Seligman & Csikszentmihalyi, 2000, p. 5). Briefly, the GAT assesses positive emotions, meaning, and personal attributes (i.e., optimism) that contribute to a full life (Fredrickson, 2001; Peterson, Park, & Seligman, 2005). Support for inclusion of this content is based on linkages between positive psychological attributes and favorable health outcomes (Rasmussen, Scheier, & Greenhouse, 2009), health behaviors (e.g., Boehm, Vie, & Kubzansky, 2012), personal success (e.g., marriage, friendship), job satisfaction, organizational commitment, citizenship, and job performance (e.g., Avey, Reichard, Luthans, & Mhatre, 2011; Lyubomirsky, King, & Diener, 2005).

Other GAT scales assess ruminative, pessimistic, and irrational thinking, reflecting the basic tenets of learned helplessness theory (Abramson, Seligman, & Teasdale, 1978; Peterson & Seligman, 1984). Learned helplessness suggests that negative attributions, which are global (affecting all facets of life), stable (persistent temporally), and internal (lacking personal control over outcomes), foster depressive thinking (e.g., Beck, Rush, Shaw, & Emery, 1979; Ellis, 1962). Extensive research has shown that pessimistic or negative explanatory style is linked to poor health (e.g., Peterson, Seligman, & Vaillant, 1988) and poor employee

[1] The terms *psychosocial fitness* and *resilience* have been used somewhat interchangeably in the GAT literature to reference the compilation of strengths and assets (i.e., skills, cognitions, affect regulation, and indices of psychological health) assessed on the GAT and targeted through soldier trainings.

productivity and retention (Seligman & Schulman, 1986). Given uncertainty regarding whether the GAT platform could be linked efficiently with other soldier health data, the Army also included a brief measure of depressive symptoms.

Additionally, the GAT assesses character, a core ingredient of Army leadership and a foundation of the Profession of Arms (Dempsey, 2012). The Army has defined character as the moral and ethical qualities, including identity, sense of purpose, values, virtues, morals, and conscience, that help people determine and choose what is right (e.g., Center for the Army Profession and Ethic, 2014; Dempsey, 2012; Headquarters, Department of the Army, 2006). Honesty, hope, bravery, industry, and teamwork are among the most evident character strengths in military samples (Matthews, Eid, Kelly, Bailey, & Peterson, 2006). Additionally, both self- and peer ratings of character strengths have been linked to orientations to happiness and life satisfaction (Buschor, Proyer, & Ruch, 2013; Peterson, Ruch, Beermann, Park, & Seligman, 2007). Perhaps most relevant to the Army, character strengths have also been linked to job performance (Harzer & Ruch, 2014), recovery from illness (Peterson, Park, & Seligman, 2006), and even posttraumatic growth (Peterson, Park, Pole, D'Andrea, & Seligman, 2008).

Preliminary Factorial and Validity Evidence

Despite the widespread use of the GAT thus far, the lack of sound, published psychometric evidence has become a source of criticism (e.g., Brown, 2014; Krueger, 2011; Steenkamp, Nash, & Litz, 2013). Validity and reliability are hallmarks features of a psychometrically sound assessment and are required to advance a measurement instrument in the service of program evaluation (Anastasi & Urbina, 1997). Peterson and colleagues (2011) reported initial estimates of internal consistency that exceeded .80 for most of the 16 a priori scales. Unfortunately, details regarding the data summarization techniques used to obtain these reliability estimates were not provided. Subsequent reports have reported internal consistency estimates ranging from a low of .68 for a three-item measure of emotion-focused coping to a high of .96 for a 24-item scale assessing character strengths (Lester et al., 2015). GAT criterion validity has been examined in several unpublished reports through prediction of military cost-drivers (e.g., suicide, drug use, and violent crimes; Lester, Harms, Bulling, Herian, & Spain, 2011), performance-related outcomes (i.e., promotion and selection; Lester, Harms, Bulling, Herian, Beal, et al., 2011), and mental and behavioral health problems (e.g., anxiety, depression, PTSD; Harms, Herian, Krasikova, Vanhove, & Lester, 2013). In addition, the GAT has been used to differentiate high-performing elite Rangers from their counterparts (Lester et al., 2015) and predict military attrition (Cunha, Arkes, Lester, & Shen, 2014).

The GAT includes an abbreviated set of character strengths items taken from the Values in Action Inventory of Strengths (VIA-IS; Peterson & Seligman, 2004). Factor analyses of the VIA-IS have produced inconsistent solutions (e.g., McGrath, 2014; Shryack, Steger, Krueger, & Kallie, 2010). Recently, Vanhove, Harms, and DeSimone (2016) used confirmatory factor analysis (CFA) to examine an abbreviated 24-item measure of character strengths and reported a superior fit for a bifactor model, positing a single general character strengths factor and the six orthogonal theoretical virtue factors.

Focus of the Present Study

We applied exploratory structural equation modeling (ESEM) techniques to test the GAT's factorial validity and measurement invariance. In contrast to confirmatory measurement approaches, ESEM does not impose simple structure, thereby allowing the assessment of cross-loadings (Morin, Marsh, & Nagengast, 2013). Additionally, latent factor correlations can be seriously inflated using CFA, which artificially constrains cross-factor loadings to zero (e.g., Asparouhov & Muthén, 2009; Morin & Maïano, 2011). Indeed, ESEM and CFA will produce nearly identical model fit results in the presence of negligible cross-factor loadings. Our expectation is that numerous GAT subscales, for example, those assessing emotion-focused coping (i.e., ineffective and reactionary coping) and negative affect or depressive symptoms, will be moderately related, thus requiring that we relax the stipulation of simple structure imposed by CFA techniques.

We also tested configural, metric, and scalar measurement invariance across gender, age, and

rank subgroups. Despite extensive evidence attesting to mean psychosocial competency differences in both gender (e.g., Diehl, Coyle, & Labouvie-Vief, 1996; Hankin & Abramson, 2001; Littman-Ovadia & Lavy, 2012; Matud, 2004; Nolen-Hoeksema & Girgus, 1994) and age (e.g., Aldwin, Sutton, Chiara, & Spiro, 1996; Diehl et al., 1996; Folkman, Lazarus, Pimley, & Novacek, 1987; Nolen-Hoeksema & Girgus, 1994) subgroups, little is known about potential factor structure differences across demographic subgroups. The few studies to examine factorial invariance have found that affect and depression factor structures are fairly invariant across gender and age (e.g., Crawford & Henry, 2004; Dozois, Dobson, & Ahnberg, 1998; Mackinnon et al., 1999), whereas the factor structure of character strengths differs across males and females (Vanhove et al., 2016). Rank, which has received little attention in the competency literature, is often associated with additional military experience and training, and may be tied, for example, to morality and civic duty. The present study thus seeks to test whether gender, age, or rank contribute to differences in factor structures, loadings, or intercepts for any of the GAT subscales. The limited research on factorial invariance in the psychosocial competency literature likely results from the inability to access the large sample sizes required to conduct such tests.

Positive psychosocial strengths (e.g., problem-focused coping, meaning, and positive affect) were expected to be inversely associated with negative attributes (e.g., emotion-focused coping, depressive symptoms, and negative affect). Given the GAT was designed to serve as a multidimensional measure of resilience, we expected to find evidence of divergent validity between the GAT resilience factors. In addition, we expected to find convergent validity within the character strengths factors, which were based on items culled from a single instrument.

Method

Sample Selection Procedures

A total of 320,503 Active Duty soldiers completed the GAT during the designated study period (December 1, 2012 to November 30, 2013) and also indicated through an electronic "opt-in" procedure that their responses could be used for research purposes. We drew four separate random samples (without replacement) of $n = 10{,}000$ from this initial pool of soldiers. Sample sizes of $n = 10{,}000$ were used to obtain very accurate parameter estimates with small standard errors within gender, age, and rank subgroups.

GAT Measures

As previously indicated, the GAT includes abridged versions of several well validated scales.[2] This section contains information on the source scales, along with sample items. In all cases, higher scores on response scales indicate more of the attribute being assessed.

Problem-focused coping. Five items adapted from the Brief COPE assess active or problem-focused coping skills (Carver, 1997; Carver, Scheier, & Weintraub, 1989). These items include planning or taking direct action (e.g., "When something stresses me out, I try to solve the problem"), positive reframing (e.g., "When bad things happen, I try to see the positive sides"), and acceptance (i.e., "For things I cannot change, I accept them and move on"). Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*not like me at all*) to 5 (*very much like me*).

Emotion-focused coping. Three additional items adapted from the Brief COPE assess emotion-focused coping strategies that involve venting or displacement and disengagement (Carver, 1997; Carver et al., 1989). These include denial (i.e., "When something stresses me out, I try to avoid it or not think about it") and internalization ([lack of] venting; e.g., "I usually keep my emotions to myself"). Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*not like me at all*) to 5 (*very much like me*).

Adaptability and flexibility. Three items written specifically for the GAT assess adaptability, ability to alter one's course, and per-

[2] Three GAT scales were excluded from the present study. Family satisfaction and family support, which were missing data for soldiers who reported no family or romantic relationships, were excluded in an attempt to avoid biasing our sample. Additionally, we chose not to include a measure of friendship, which consists of five dichotomous (yes–no) questions and one ordered categorical question, because of the different response formats.

ceived cognitive flexibility (e.g., Martin & Rubin, 1995). Items include "I am good at changing myself to adjust to changes in my life," "It is difficult for me to adjust to changes" (reversed-scored item), and "I can usually fit myself into any situation." Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*not like me at all*) to 5 (*very much like me*).

Positive affect. Ten items adapted from the Positive and Negative Affect Schedule Expanded Form (PANAS-X: Watson & Clark, 1994) assess general positive affect (e.g., "inspired"), as well as joviality (e.g., "happy"), self-assurance (i.e., "proud"), and serenity (i.e., "calm"). Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*never*) to 5 (*most of the time*).

Negative affect. Eleven items adapted from the PANAS-X (Watson & Clark, 1994) assess general negative affect (e.g., "distressed"), as well as fear (e.g., "scared"), hostility (e.g., "angry"), guilt (e.g., "guilty"), and sadness (i.e., "sad"). Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*never*) to 5 (*most of the time*).

Catastrophic thinking. Seven items adapted from the Attributional Style Questionnaire (Peterson et al., 1982) were designed to assess the stable, global, and internal attributions (i.e., explanatory style) individuals make in response to negative events (e.g., "When bad things happen to me, I expect more bad things to happen"). Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*not like me at all*) to 5 (*very much like me*).

Optimism. Four items taken from the revised Life Orientation Test (Scheier & Carver, 1985; Scheier, Carver, & Bridges, 1994) assess dispositional optimism grounded in a generalized expectance for positive future events. Two items are positively worded (e.g., "Overall, I expect more good things to happen to me than bad"), and two are negatively worded and reverse scored (e.g., "If something can go wrong for me, it will"). Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Depressive symptoms. Eight items adapted from the Patient Health Questionnaire (e.g., Kroenke, Spitzer, & Williams, 2001; Spitzer, Kroenke, & Williams, 1999) assess depressive symptoms (e.g., feeling down, depressed, or hopeless) using a past-4-week time frame. In addition, two items were developed to specifically assess depressive symptoms in Army soldiers (i.e., "feeling very frustrated"; "feeling very angry"). Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*not at all*) to 5 (*every day*).

Loneliness. Three items from the UCLA Loneliness Scale (Russell, Peplau, & Ferguson, 1978) assess subjective feelings of loneliness. One item is negatively worded (e.g., "How often do you feel left out?"), and two are positively worded and reverse scored (e.g., "How often do you feel close to people"). Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*never*) to 5 (*most of the time*).

Work engagement. Four items adapted from Wrzesniewski, McCauley, Rozin, and Schwartz (1997) assess feeling one's work is fulfilling and socially useful (e.g., "My work is one of the most important things in my life"). Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*not like me at all*) to 5 (*very much like me*).

Organizational trust. Five items adapted from Mayer, Davis, and Schoorman (1995) and Sweeney, Thompson, and Blanton (2009) assess three dimensions of organizational trust: ability (e.g., "My immediate supervisor has much knowledge about the work that needs to be done"), benevolence (i.e., "I trust my fellow Soldiers in my unit to look out for my welfare and safety"), and integrity (e.g., "Overall, I trust my immediate supervisor"). Items were presented to respondents in Likert format with a 5-point response scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Meaning. Five items assessing meaning (e.g., "My life has meaning" and "I believe there is a purpose for my life") were modeled after the Purpose in Life scale (e.g., Crumbaugh, 1968). These items are consistent with Frankl's existential perspective and spirituality themes (e.g., Brief Multidimensional Measure of Religiousness/Spirituality; Fetzer Institute, 1999). Items were presented to respondents in Likert format with a 5-point response scale

ranging from 1 (*not like me at all*) to 5 (*very much like me*).

Character strengths. The Abbreviated Character Strengths Test, an abridged version of the VIA-IS (Peterson & Seligman, 2004), uses single items to capture 24 character strengths that map onto six character virtues: wisdom and knowledge (e.g., "curiosity"), courage (e.g., "bravery"), humanity (e.g., "love"), justice (e.g., "fairness"), temperance ("forgiveness or mercy"), and transcendence (e.g., "gratitude"). Items were presented to respondents on an 11-point response scale ranging from 0 (*never*) to 10 (*always*).

Model Testing Strategy

All analyses were performed using Mplus 7.11 (Muthén & Muthén, 1998–2012). Mean imputation was applied to missing data (less than 0.04% for each GAT item). The ESEM models were estimated with an oblique geomin rotation using an epsilon value of 0.5 (Marsh et al., 2009, 2010). Because of the ordered-categorical nature of the GAT response options, we used the robust maximum likelihood estimator (MLR) to obtain robust standard errors and corrected tests of model fit for item-level analyses (e.g., Hoyle, 2012; Morin & Maïano, 2011), and we used the maximum likelihood estimator (ML) for subsequent analyses using composite scores. Given differences in response option formats between character strengths (assessed on an 11-point scale) and the remaining GAT items (assessed using a 5-point Likert format), we examined these in separate analyses.

Following tests of factorial validity, we calculated composite scores based on the primary loading for each item. This procedure enabled us to test the suitability of a higher order factor structure (suggesting a more parsimonious set of factors could account for the associations among the primary factor scales). We then repeated the primary and follow-up ESEM analyses in a second random sample of 10,000 Active Duty soldiers in order to examine the replicability of the obtained factor structures.

Using a third random sample of 10,000 Active Duty soldiers, we tested measurement invariance across three demographic subgroups: gender (male vs. female), age (under 30 years vs. 30 years and older), and rank (officer vs. enlisted). Then, using a fourth random sample of 10,000 Active Duty soldiers, we examined associations between the obtained resilience and character strengths factor structures in order to assess convergent and discriminant validity. Model fit was evaluated using several goodness-of-fit criteria, including the comparative fit index (CFI; Bentler, 1990) and Tucker-Lewis fit index (TLI; Tucker & Lewis, 1973), which are based on the likelihood function and account for both sample size and model parsimony. We also used the root mean square error of approximation (RMSEA; Steiger, 1990) and its 90% confidence intervals, as well as the standardized root mean square residual (SRMR; Jöreskog & Sörbom, 1986). We report the chi-square test of model fit, which is sensitive to sample size and minor deviations from multivariate normality; however, we do not use it to evaluate model fit (Marsh, Balla, & McDonald, 1988).

The invariance tests involve parameter-nested models in which the more restrictive model with the additional equality constraints is evaluated against the less restrictive model absent the posited constraints. We used a MLR scaling correction to calculate scaled chi-square difference tests for item-level analyses. We also used the model log likelihoods in order to calculate the scaled chi-square difference tests with greater precision (Hoyle, 2012; Morin & Maïano, 2011). A nonsignificant scaled chi-square difference test ($p > .05$) indicates the tenability of the imposed constraints, whereas a significant difference test provides evidence of group differences. In addition, following recommendations by Marsh and colleagues (2010), we assessed the magnitude of change in CFI using the recommended .01 benchmark (see also Chen, 2007; Cheung & Rensvold, 2002). Additionally, given concerns regarding the large number of parameters estimated in ESEM (Marsh et al., 2009, 2010), we also examined changes in fit indices that correct for parsimony (TLI and RMSEA).

Analytic work was conducted in the Person-Event Data Environment (PDE), a secure, virtual computer repository that houses Army

workforce, medical, and personnel data.[3] The University of Pennsylvania Institutional Review Board and the Army Human Research Protections Office regulatory authority both approved the study protocol.

Results

Sample Characteristics

Males comprised 84% to 85% of the four randomly drawn samples, and the mean age was 30 years (SD = 8.34 to 8.50). The samples self-identified as follows: non-Hispanic White (59% to 60%), African American (21% to 22%), Hispanic (12%), Asian (3% to 4%), and other (e.g., Pacific Islander, Hawaiian; 3%). At the time of the GAT assessment, 18% to 20% of the soldiers in each sample were officers, and the average length of military service was 9 years (SD = 7.96 to 8.14). Roughly 28% of each sample had more than a high school diploma, and 59% to 61% of soldiers were married.

Resilience: Factor Validity and Reliability

We began by testing a one-factor model, which provided a basis to contrast any subsequent model refinements. We then tested models progressively until we reached a satisfactory and theoretically consonant factor solution. Analyses identified a subset of questionable items, which we inspected on a case-by-case basis for retention. OPT1 and OPT4 (the two positively worded optimism items), NA8 (a negative affect item assessing boredom), and AF2 (the only negatively worded adaptability item) all contained primary loadings <.3 and were excluded from future analysis (Costello & Osborne, 2005; Tabachnick & Fidell, 2001). Two additional items ("feeling very angry" and "feeling very frustrated," DEP9 and DEP10, respectively) had loadings >.3 on both the depressive symptoms and negative affect factors and were excluded from future analysis. The remaining items with cross-loadings greater than 0.3 clearly fit a primary factor and were retained for further analysis. Table 1 shows the resulting model fit indices (based on the remaining 64 items), which support a conceptually clear 11-factor resilience model (CFI = .949, TLI = .924, RMSEA = .034, and SRMR = .015).

The 11 factors include Self-Management (e.g., problem-focused coping and adaptability), Positive Affect (e.g., joy, happiness, excitement), Meaning (e.g., purpose for my life), Work Engagement (e.g., commitment to current job), Organizational Trust (e.g., trust in immediate supervisor and unit), Loneliness (e.g., feeling left out), Negative Cognitions (e.g., perceiving things worse than they are), Hostility (e.g., upset, angry, hostile), Negative Emotions (e.g., sad, ashamed, guilty), Depressive Symptoms (e.g., feeling down, depressed or hopeless), and Emotion-Focused Coping (e.g., avoiding problems). Table 2 contains the standardized ESEM parameter estimates (factor loadings and uniquenesses). The loadings tended to be substantial across all 11 factors (M = .56, SD = .14). In addition, cross-loadings remained consistently small (M = .06, SD = .05).

In the case of Emotion-Focused Coping, two items assessing keeping feelings to one's self (EC2 and EC3) had loadings exceeding λ = .89, whereas a third item, assessing avoidance (EC1), only had a loading of λ = .333. In addition, Item 5 from the Meaning scale (MN5: meaning derived from Army work) demonstrated a primary loading on the Work Engagement factor, which assesses soldiers' engagement with their Army work. Moving on to the Loneliness factor, Items 2 and 3 (worded in terms of social inclusion and reverse scored) demonstrated much larger loadings (λ > .80) compared with Item 1, which assesses feeling left out (λ = .381).

With one exception (α = .69 for Emotion-Focused Coping [three items]), estimates of internal consistency were all relatively high (> .70) for the 11 resilience factors (α = .86 for Self-Management [seven items], .95 for Positive Affect [10 items], .87 for Meaning [four items], .85 for Work Engagement [five items], .87 for Organizational Trust [five items], .82 for Loneliness [three items], .89 for Negative Cognitions [nine items], .88 for Hostility [five items], .83 for Negative Emotions [five items],

[3] Both Federal and Department of Defense guidelines mandate certain human subjects' protections, including adherence to strict protocols for deidentification in the presence of personally identifying and protected health information. For more information regarding the procedures implemented to remove subject identifiers in the PDE, see Vie, Griffith, Scheier, Lester, and Seligman (2013) and Vie and colleagues (2015).

Table 1
Exploratory Structural Equation Model Fit Statistics

Model	χ^2 (*df*)	CFI	TLI	RMSEA	90% CI	SRMR	CM	$\Delta\chi^2$ (Δdf)[a]	ΔCFI	ΔTLI	ΔRMSEA
Resilience first-order factors											
1-factor model	122,171.29 (1952)	.601	.588	.078	.078, .079	.078	—	—	—	—	—
2-factor model	96,514.41 (1889)	.686	.665	.071	.070, .071	.060	1F	18,972.90 (63)	.085	.077	−.007
3-factor model	84,907.49 (1827)	.725	.696	.067	.067, .068	.053	2F	6,951.69 (62)	.039	.031	−.004
4-factor model	69,278.29 (1766)	.776	.744	.062	.061, .062	.045	3F	24,320.50 (61)	.051	.048	−.005
5-factor model	59,914.45 (1706)	.807	.772	.058	.058, .059	.040	4F	6,712.48 (60)	.031	.028	−.004
6-factor model	48,945.36 (1647)	.843	.808	.054	.053, .054	.034	5F	15,684.00 (59)	.036	.036	−.004
7-factor model	41,110.06 (1589)	.869	.834	.050	.049, .050	.029	6F	9,041.15 (58)	.026	.026	−.004
8-factor model	32,401.71 (1532)	.898	.865	.045	.044, .045	.025	7F	11,930.90 (57)	.029	.031	−.005
9-factor model	27,179.31 (1476)	.915	.884	.042	.041, .042	.021	8F	4,029.49 (56)	.017	.019	−.003
10-factor model	21,419.95 (1421)	.934	.906	.038	.037, .038	.017	9F	10,487.60 (55)	.019	.022	−.004
11-factor model	16,883.36 (1367)	.949	.924	.034	.033, .034	.015	10F	4,867.66 (54)	.015	.018	−.004
Resilience higher order factors											
1-factor model	7,292.49 (44)	.863	.829	.128	.126, .131	.056	—	—	—	—	—
2-factor model	2,876.98 (34)	.946	.913	.091	.089, .094	.033	1F	4,415.51 (10)	.083	.084	−.037
Character strengths factors											
1-factor model	7,738.06 (135)	.861	.843	.075	.074, .076	.049	—	—	—	—	—
2-factor model	3,890.41 (118)	.931	.911	.057	.055, .058	.029	1F	3,246.52 (17)	.070	.068	−.018
3-factor model	2,827.69 (102)	.950	.925	.052	.050, .053	.024	2F	855.84 (16)	.019	.014	−.005
4-factor model	1,857.61 (87)	.968	.943	.045	.043, .047	.017	3F	866.53 (15)	.018	.018	−.007

Note. All *ps* < .0001. *df* = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; 90% CI = 90% confidence interval of the RMSEA; SRMR = standardized root mean square residual; CM = comparison model; Δ = change.
[a] Relied on scaled chi-square difference tests (calculated from model log likelihoods for greater precision) for item-level analyses (resilience first order factors and character strengths factors). Computed from our first random sample of n = 10,000.

Table 2
Resilience: Standardized Factor Loadings and Uniquenesses

Item	SM (λ)	PA (λ)	MN (λ)	ENG (λ)	OT (λ)	LON (λ)	NC (λ)	HS (λ)	NE (λ)	DEP (λ)	EC (λ)	δ
PC1	**.507**	−.008	.069	.015	.077	−.044	−.028	−.102	.042	−.054	.077	.601
PC2	**.518**	.015	.083	.043	.037	−.054	−.022	−.178	.109	−.035	.078	.544
PC3	**.444**	.050	.112	.126	.038	−.040	−.020	.093	−.130	.013	−.084	.588
PC4	**.496**	.077	.138	.055	.062	−.070	−.104	−.141	.112	−.012	−.004	.434
PC5	**.505**	.052	.097	.077	.041	−.101	−.071	−.061	−.047	−.051	.017	.448
AF1	**.562**	.033	.103	.080	.036	−.105	−.008	.041	−.126	−.032	−.016	.426
AF3	**.560**	.032	.054	.072	.038	−.139	.018	.114	−.173	.023	−.038	.477
PA1	.145	**.444**	.056	.028	.069	−.111	−.038	−.198	−.027	−.057	−.034	.387
PA2	.087	**.531**	.019	.001	.053	−.159	.016	.013	−.106	−.038	−.085	.455
PA3	.105	**.498**	.162	.095	.089	−.088	−.065	−.105	.049	−.030	−.067	.316
PA4	.097	**.532**	.092	.053	.055	−.169	−.003	−.097	−.036	−.066	−.084	.271
PA5	.065	**.567**	.033	.079	.085	−.139	.010	−.057	.011	−.048	−.080	.361
PA6	.108	**.491**	.093	.133	.083	−.093	−.038	−.130	.095	−.036	−.079	.351
PA7	.018	**.431**	.195	−.013	.014	−.182	−.011	−.028	−.033	−.019	−.111	.488
PA8	.030	**.477**	.180	.178	.080	−.120	−.045	−.018	−.090	−.031	−.041	.324
PA9	.076	**.512**	.118	.066	.078	−.151	−.025	−.121	−.094	−.064	−.062	.242
PA10	.102	**.557**	.056	.109	.060	−.135	−.036	−.066	.000	−.112	−.075	.255
MN1	.007	.005	**.772**	.057	.039	−.089	−.008	−.030	.013	−.015	−.038	.242
MN2	.215	.011	**.568**	.077	.041	−.072	−.041	.089	−.144	.015	−.022	.353
MN3	.021	.002	**.821**	.026	.036	−.086	−.012	.006	−.069	−.021	−.027	.150
MN4	.161	.053	**.468**	.065	.012	−.080	.001	−.103	.174	−.027	−.094	.523
MN5	.041	.008	.308	**.440**	.096	−.097	−.035	−.112	.098	−.052	−.031	.392
ENG1	.020	.028	.005	**.741**	.038	−.040	.002	−.046	.038	−.002	.002	.371
ENG2	.020	−.007	.018	**.627**	.053	−.025	.048	.053	−.032	.005	.010	.572
ENG3	.077	−.003	.079	**.707**	.078	−.052	−.006	.038	−.092	.000	−.015	.315
ENG4	−.002	.018	.010	**.647**	.088	−.033	−.032	−.062	.033	−.022	−.052	.455
OT1	.047	.017	.008	.140	**.476**	−.195	−.012	−.084	.032	−.041	−.028	.483
OT2	.046	.024	−.036	.170	**.475**	−.086	−.018	−.084	.021	−.018	−.022	.576
OT3	.023	.032	.047	.118	**.590**	−.099	−.035	−.036	−.027	−.010	−.057	.420
OT4	.020	−.003	.030	.002	**.799**	.006	.018	.002	.002	.015	.007	.356
OT5	−.019	−.016	.014	.005	**.913**	−.014	.015	.016	−.012	.003	−.009	.170
LON1	−.066	−.036	−.028	.017	−.058	**.381**	.210	.058	.120	.088	.069	.499
LON2	.000	−.014	−.074	−.009	−.021	**.806**	−.042	−.010	−.027	−.019	.092	.256
LON3	.001	.066	−.010	−.032	−.042	**.915**	−.032	−.033	.000	−.007	.034	.176
CT1	−.082	−.026	−.081	−.015	−.042	.076	**.603**	.156	−.072	.053	.136	.334
CT2	−.042	−.031	−.041	.055	.007	.068	**.477**	.093	.070	.034	.138	.569
CT3	−.075	−.013	−.050	−.032	−.024	.052	**.644**	.068	.078	.082	.100	.299
CT4	−.032	.005	.048	−.040	−.027	.026	**.534**	−.013	.139	.083	.031	.584
CT5	.018	−.001	−.048	−.070	−.043	.039	**.433**	−.01	.067	.051	.066	.699
CT6	−.008	−.001	−.141	−.046	−.035	.060	**.522**	−.091	.223	.066	.011	.467
CT7	−.085	.007	−.100	−.031	−.038	.063	**.561**	−.027	.181	.053	−.005	.428
OPT2	.099	.044	.044	.033	.041	−.139	**–.456**	−.149	.014	−.005	−.108	.494
OPT3	.033	.077	.110	.029	.031	−.156	**–.367**	−.109	.041	−.011	−.106	.602
NA2	−.056	−.068	−.018	−.034	−.024	.089	.047	**.343**	.290	.101	.032	.505
NA4	−.042	−.057	−.008	−.041	−.053	.083	.013	**.595**	.207	.041	.039	.318
NA5	−.020	−.01	−.053	−.039	−.093	.057	.016	**.682**	.069	.036	.052	.311
NA9	.002	.01	−.101	−.049	−.090	.057	.044	**.467**	.144	.080	.039	.511
NA11	−.046	−.067	.003	−.069	−.085	.063	.027	**.611**	.070	.088	.069	.326
NA1	−.067	−.115	−.025	−.024	−.028	.102	.033	.328	**.351**	.094	.050	.409
NA3	.007	.002	−.118	−.01	−.039	.081	.032	.124	**.581**	−.004	.043	.461
NA6	−.044	−.002	−.084	−.012	−.024	.048	.029	.133	**.550**	.022	.031	.509
NA7	−.096	.014	.013	−.022	−.014	.062	.071	.193	**.526**	.032	.042	.473
NA10	−.146	.060	.073	−.007	−.017	.071	.074	.256	**.330**	.083	.081	.599
DEP1	−.008	−.099	−.095	−.056	−.031	.103	.068	.038	.076	**.514**	.083	.419
DEP2	−.006	−.084	−.136	−.017	−.036	.080	.074	.069	.206	**.517**	.050	.318

Table 2 (*continued*)

Item	SM (λ)	PA (λ)	MN (λ)	ENG (λ)	OT (λ)	LON (λ)	NC (λ)	HS (λ)	NE (λ)	DEP (λ)	EC (λ)	δ
DEP3	−.064	−.005	.015	−.055	−.035	.087	.018	.141	−.113	**.594**	.109	.453
DEP4	−.105	−.062	.030	−.059	−.023	.082	.040	.141	−.078	**.622**	.090	.355
DEP5	−.049	−.016	−.040	−.034	−.037	.089	.052	.073	.034	**.614**	.062	.391
DEP6	.013	−.027	−.178	.027	−.036	.077	.107	.018	.313	**.432**	.036	.378
DEP7	−.012	−.022	−.060	−.034	−.053	.082	.019	.035	.132	**.589**	.032	.424
DEP8	.007	.014	−.073	−.005	−.051	.034	.049	−.015	.218	**.532**	.028	.511
EC1	.040	.036	.063	−.052	−.002	.013	.115	−.135	.160	−.001	**.333**	.827
EC2	.051	.048	.028	.030	.018	−.009	−.072	−.033	−.053	−.031	**.891**	.277
EC3	.025	.044	.005	.021	.014	−.010	−.037	−.025	−.025	−.032	**.893**	.262

Higher order factor analysis

Factor	PPC (λ)	NPC (λ)	δ
SM	**.650**	−.190	.407
PA	**.682**	−.264	.270
MN	**.703**	−.097	.422
ENG	**.602**	−.003	.636
OT	**.519**	−.149	.624
LON	**−.533**	.312	.438
NC	−.103	**.502**	.681
HS	−.171	**.735**	.294
NE	.012	**.854**	.282
DEP	−.248	**.610**	.402
EC	−.037	.200	.951

Note. Bold entries = primary loadings. Computed from our first random sample of n = 10,000. λ = standardized factor loading; δ = standardized uniqueness; PC = problem-focused coping; AF = adaptability/flexibility; PA = positive affect; MN = meaning; ENG = work engagement; OT = organizational trust; LON = loneliness; CT = catastrophic thinking; OPT = optimism; NA = negative affect; DEP = depressive symptoms; EC = emotion-focused coping; SM = self-management; NC = negative cognitions; HS = hostility; NE = negative emotions; PPC = positive psychosocial competencies; NPC = negative psychosocial competencies.

and .91 for Depressive Symptoms [eight items]).

Testing higher order factor structures. We next tested the suitability of a higher order factor solution (see Table 1) using composite scores obtained from the 11-factor primary model. A two-factor model fit the data reasonably well (CFI = .946, TLI = .913, RMSEA = .091, and SRMR = .033) and improved significantly upon the one-factor model, $\Delta\chi^2(10) = 4415.5$, $p < .0001$. The two factors reflect positive and negative psychosocial competencies. The bottom portion of Table 2 contains the standardized ESEM parameter estimates for the higher order model. Most GAT composite scores clearly loaded on one of the two higher order factors. Excluding Emotion-Focused Coping, the primary loadings tended to be substantial (M = .64, SD = .11), and cross-loadings remained consistently small in terms of their absolute values (M = .15, SD = .10).

Replication analyses. We replicated both the primary and higher order model in a second random sample of 10,000 soldiers. By all accounts, both the primary (CFI = .949, TLI = .925, RMSEA = .033, and SRMR = .015) and higher order model (CFI = .954, TLI = .925, RMSEA = .084, and SRMR = .031) fit well. The pattern of factor loadings was consistent between the two samples (absolute average difference in primary factors loadings = .011, and the difference in higher order loadings = .013).

Character Strengths: Factor Validity, Reliability, and Replication

We repeated the same model testing procedure with the 24 character strengths items, beginning with a one-factor model to establish a baseline comparison model. Six items with cross-loadings greater than 0.3 were excluded from further analysis ("bravery or courage,"

"persistence," "zest or enthusiasm," "appreciation of beauty and excellence," "social skills or social awareness or street smarts," and "spirituality"). The resulting trimmed model supported a conceptually clear four-factor solution (CFI = .968, TLI = .943, RMSEA = .045, and SRMR = .017). Table 1 shows the model fit statistics for each factor structure tested.

The four character strengths factors include Intellect (curiosity, love of learning), Civic Strengths (honesty, fairness, and teamwork), Temperance (forgiveness, humility, and prudence), and Warmth (kindness, gratitude, and playfulness). Table 3 contains the standardized parameter estimates from the ESEM model. The primary factor loadings were substantial (M = .58, SD = .10), and the cross-loadings tended to be small (M = .12, SD = .07). Estimates of internal consistency were satisfactory for the four character strengths factors (α = .94 for Intellect [five items], .88 for Civic Strengths [four items], .87 for Temperance [four items], and .91 for Warmth [five items]).

We next tested whether the obtained character strengths factor structure would replicate in a second random sample of 10,000 soldiers. The four-factor solution fit the data well (CFI = .958, TLI = .927, RMSEA = .051, and SRMR = .019). The pattern of factor loadings in the second sample was consistent (absolute average difference in factor loadings = .016).

Table 3
Character Strengths: Standardized Factor Loadings and Uniquenesses

Item	IN (λ)	CS (λ)	TP (λ)	WM (λ)	δ
WK1	**.642**	.137	.114	.057	.327
WK2	**.656**	.051	.061	.244	.238
WK3	**.646**	.229	.093	.081	.202
WK4	**.605**	.082	.130	.202	.265
WK5	**.626**	.174	.176	.080	.215
CG3	.198	**.385**	.099	.145	.529
JUS1	.083	**.609**	.119	.190	.246
JUS2	.032	**.737**	.169	.058	.180
JUS3	.138	**.590**	.137	.057	.356
TP1	.001	.150	**.536**	.224	.366
TP2	.044	.105	**.739**	.018	.294
TP3	.096	.086	**.686**	.043	.331
TP4	.086	.206	**.368**	.243	.437
HM1	.158	.098	.053	**.575**	.410
HM2	.132	.172	.193	**.466**	.354
TR2	.000	.244	.237	**.526**	.246
TR3	.124	.105	.169	**.596**	.275
TR4	.146	.159	.109	**.514**	.384

Note. Bold entries = primary loadings. Computed from our first random sample of n = 10,000. λ = standardized factor loading; δ = standardized uniqueness; WK = wisdom/knowledge; CG = courage; JUS = justice; TP = temperance; HM = humanity; TR = transcendence; IN = intellect; CS = civic strengths; WM = warmth.

Tests of Configural and Measurement Invariance

Table 4 shows the fit indices from the configural, metric, and scalar tests of measurement invariance for the three demographic subgroups. As depicted, the ESEM factor structures for the GAT resilience and character strengths models fit well across gender, age, and rank subgroups. The various inferential goodness-of-fit statistics (CFI, TLI, RMSEA, and SRMR) are, for the most part, within the suggested limits and reinforce the adequate fit between the hypothesized model and sample data. Given that even trivial deviations in parameter estimates may produce a significant nested chi-square test with large sample sizes (Marsh et al., 1988), we primarily considered model fit indices that are less influenced by sample size. For instance, in all of the subgroup comparisons, the decrement in CFI did not reach the level required to signal rejection of the null hypothesis (i.e., equivalent between-group measurement parameters; Cheung & Rensvold, 2002). Additionally, constraining factor loadings to equality resulted in an improvement in the TLI for all subgroups and domains. Constraining the item intercepts to equality, however, produced a trivial decrease in the TLI in the resilience domain. Across the GAT resilience and character strengths domains, the RMSEA shrunk following imposition of the factor loading constraints, suggesting improved model fit. The RMSEA either remained unchanged or increased a trivial amount (+.001) when item intercepts were constrained to equality.

The absolute average difference in factor loadings, summarizing the differences between each demographic subgroup, was computed for each GAT domain and was quite small in most instances: Resilience (gender, $\Delta\lambda$ = .033; age, $\Delta\lambda$ = .019; rank, $\Delta\lambda$ = .023) and Character Strengths (age, $\Delta\lambda$ = .059; rank, $\Delta\lambda$ = .038). Practically speaking, these differences are quite negligible and suggest the tenability of the null model specifying equivalent structures. We did,

Table 4
Model Fit Statistics of the Tests of Configural and Measurement Invariance

Model	Description	$\chi^2(df)$	CFI	TLI	RMSEA	90% CI	SRMR	CM	$\Delta S\chi^2$ (Δdf)	ΔCFI	ΔTLI	ΔRMSEA
Resilience												
Gender	G1: Configural invariance	18,933.86 (2734)	.947	.922	.034	.034, .035	.016	—	—	—	—	—
	G2: λ Invariant	19,384.70 (3317)	.948	.936	.031	.031, .032	.018	G1	739.34 (583)	.001	.014	−.003
	G3: τ Invariant	20,061.27 (3370)	.946	.935	.031	.031, .032	.019	G2	776.24 (53)	−.002	−.001	.000
Age	A1: Configural invariance	18,843.79 (2734)	.947	.921	.034	.034, .035	.016	—	—	—	—	—
	A2: λ Invariant	19,601.55 (3317)	.946	.935	.031	.031, .032	.020	A1	938.81 (583)	−.001	.014	−.003
	A3: τ Invariant	20,469.74 (3370)	.943	.932	.032	.031, .032	.021	A2	1,045.30 (53)	−.003	−.003	.001
Rank	R1: Configural invariance	18,914.81 (2734)	.947	.921	.034	.034, .035	.016	—	—	—	—	—
	R2: λ Invariant	19,581.97 (3317)	.946	.935	.031	.031–.032	.020	R1	944.06 (583)	−.001	.014	−.003
	R3: τ Invariant	20,515.50 (3370)	.944	.933	.032	.031–.032	.021	R2	1,118.34 (53)	−.002	−.002	.001
Character strengths												
Gender	G1: Configural invariance	2,085.14 (174)	.968	.943	.047	.045–.049	.017	—	—	—	—	—
	G2: λ Invariant	2,222.73 (230)	.966	.955	.042	.040–.043	.020	G1	166.17 (56)	−.002	.012	−.005
	G3: τ Invariant	2,358.38 (244)	.964	.955	.042	.040–.043	.021	G2	136.25 (14)	−.002	.000	.000
Age	A1: Configural invariance	1,981.22 (174)	.967	.942	.046	.044, .047	.017	—	—	—	—	—
	A2: λ Invariant	2,139.11 (230)	.965	.953	.041	.039, .042	.022	A1	211.62 (56)	−.002	.011	−.005
	A3: τ Invariant	2,279.84 (244)	.963	.953	.041	.039, .042	.024	A2	148.64 (14)	−.002	.000	.000
Rank	R1: Configural invariance	2,108.67 (174)	.965	.939	.047	.045, .049	.017	—	—	—	—	—
	R2: λ Invariant	2,067.66 (230)	.967	.956	.040	.038, .042	.023	R1	87.34 (56)	.002	.017	−.007
	R3: τ Invariant	2,178.14 (244)	.965	.957	.040	.038, .041	.025	R2	92.18 (14)	−.002	.001	.000

Note. All *p*s < .01. Computed from our third random sample of n = 10,000. *df* = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; 90% CI = 90% confidence interval of the RMSEA; SRMR = standardized root mean square residual; CM = comparison model; $\Delta S\chi^2$ = scaled chi square difference test (calculated from model log likelihoods for greater precision); Δ = change; λ = factor loading; τ = intercept.

however, obtain evidence supporting potential gender differences in the factor structure for character strengths ($\Delta\lambda = .121$). Further inspection revealed civic strengths and temperance may best be reflected by a single factor for females and posited as two distinct factors for males.

Convergent and Discriminant Validity

The prior invariance findings suggest relative measurement consistency across the different demographic groups. Therefore, we tested convergent and discriminant validity in a fourth random of 10,000 soldiers, examined together in a single group. Table 5 shows the pattern of correlations among all 15 latent factors (the 11 resilience factors and the four character factors). Overall, the pattern of correlations within-domain for the 11 GAT resilience factors (upper left-hand portion of Table 5) reinforces a modicum of divergence for these scales (average $\hat{r} = .23$; $SD = .09$). The largest associations were observed between Loneliness and both Positive Affect ($\hat{r} = -.42$) and Meaning ($\hat{r} = -.41$). The remaining associations ranged in magnitude from a low of $\hat{r} = -.06$ (between Self-Management and Emotion-Focused Coping) to a high of $\hat{r} = .39$ (between Self-Management and Meaning). Table 5 (bottom right-hand portion) also shows the within-domain associations for the character strengths factors. The magnitude of associations was much higher, on average, than in the resilience domain (average $\hat{r} = .53$; $SD = .06$), with correlations ranging from $\hat{r} = .42$ (between Intellect and Temperance) to $\hat{r} = .62$ (between Civic Strengths and Temperance), reinforcing convergent validity.

The cross-domain associations suggest that resilience and character strengths capture somewhat unique facets of psychosocial fitness (upper right portion of Table 5). Overall, Meaning, Self-Management, and Loneliness demonstrated the largest and most consistent associations across the four character strengths factors (average $\hat{r} = .49$, .50, and .43, respectively). In contrast, Emotion-Focused Coping and Negative Emotions were least associated with character strengths (average $\hat{r} = .17$ and .20, respectively). All correlations were in the expected direction.

Discussion

Findings from this study support the GAT as a reliable, multidimensional assessment of psychosocial fitness. In addition, the use of four large random samples taken from a well-defined population of Army Active Duty soldiers re-

Table 5
Examining Convergent and Discriminant Validity

Factor	PA	MN	ENG	OT	LON	NC	HS	NE	DEP	EC	IN	CS	WM	TP
SM	.302	.394	.280	.225	−.360	−.235	−.273	−.175	−.180	−.059	***.529***	***.489***	***.459***	***.531***
PA		.319	.247	.219	**−.421**	−.132	−.310	−.099	−.222	−.185	*.399*	*.285*	***.562***	*.271*
MN			.312	.216	**−.409**	−.246	−.195	−.189	−.231	−.165	***.423***	***.485***	***.625***	***.419***
ENG				.357	−.296	−.110	−.194	−.067	−.144	−.116	*.365*	*.384*	*.350*	*.358*
OT					−.334	−.128	−.259	−.102	−.167	−.112	*.236*	*.325*	*.357*	*.285*
LON						.259	.337	.255	.297	.306	*−.399*	***−.408***	***−.583***	*−.333*
NC							.220	.290	.278	.236	*−.218*	*−.207*	*−.234*	*−.200*
HS								.329	.339	.162	*−.213*	*−.142*	*−.397*	*−.314*
NE									.311	.141	*−.237*	*−.312*	*−.177*	*−.058*
DEP										.175	*−.265*	*−.179*	*−.352*	*−.187*
EC											*−.201*	*−.127*	*−.254*	*−.115*
IN												**.508**	**.513**	**.424**
CS													**.547**	**.618**
WM														**.545**

Note. All correlations are statistically significant ($p < .001$). Correlations ≥.40 are bolded. Between-domain correlations are italicized. Computed from our fourth random sample of $n = 10{,}000$. SM = self-management; PA = positive affect; MN = meaning; ENG = work engagement; OT = organizational trust; LON = loneliness; NC = negative cognitions; HS = hostility; NE = negative emotions; DEP = depressive symptoms; EC = emotion-focused coping; IN = intellect; CS = civic strengths; WM = warmth; TP = temperance.

sulted in extraordinarily accurate parameter estimates. Turning first to evidence of the instrument's factorial validity, the ESEM findings revealed an 11-factor resilience model fit the data well and reinforced competency as a constellation of skills and affective mood states that can help soldiers steel against the demands of rigorous training and battle. Our results suggest that competent soldiers are cognitively flexible, employ problem-focused coping strategies, expect a favorable future, and generally report positive affect. Competent soldiers also avoid engaging in denial and emotional venting, do not blame themselves for bad outcomes, and report less negative affect. Within the context of the Army, competent soldiers tend to trust their peers and superior officers, feel they belong in the armed forces, find meaning in their work, and do not feel lonely or depressed (e.g., blue or sad) serving in the Army. The ESEM findings support the GAT resilience domain as a multidimensional measure, despite the abridged nature of the scales. Findings also support a higher order model capturing the association among the 11 primary factors (using composite scores). Broadly speaking, the 11 primary factors can be grouped along the lines of whether they assess positive or negative facets of psychosocial functioning.

Additional evidence suggests that character should be considered part of the overall strengths and assets that comprise soldier well-being. The four factors embodying character include Intellect, Civic Strengths, Temperance, and Warmth. Intellect involves critical thinking, creativity, and perspective. Civic Strengths include citizenship, fairness, and leadership, whereas Temperance includes forgiveness, humility, and self-control. The Warmth component involves love, kindness, gratitude, and hope. For soldiers, good character provides a platform from which to excel in the military, even in the face of potential adversity. To date, a series of different character strengths factor structures have been extracted from the VIA-IS and the abbreviated character strengths measure examined in this study (e.g., McGrath, 2014; Shryack et al., 2010; Vanhove et al., 2016). The inability to identify and replicate a character factor structure across multiple studies may be attributed to differences in sample characteristics, analytic approaches, extraction techniques, rotational methods, or the number of items analyzed.

One of the strengths of the ESEM methodology when compared with confirmatory procedures is the ability to estimate meaningful cross-factor loadings rather than impose simple structure. In addition, we were able to reduce the bias in our factor-to-factor associations. Through this approach, we obtained a purer picture of the multidimensional composition of resilience and character strengths.

Findings From Tests of Measurement Invariance

The measurement invariance tests reinforce previous findings (e.g., Crawford & Henry, 2004; Dozois et al., 1998; Mackinnon et al., 1999) and extend our knowledge of GAT resilience and character strengths measurement properties across gender, age, and rank subgroups. Overall, the addition of each restriction in a stepwise manner did not significantly worsen model fit, reinforcing the tenability of positing identical factor structures, loadings, and item intercepts. Tests of the four character strengths factors, however, supported invariance for age and rank, but indicated partial measurement invariance for the gender comparison. Civic strengths and temperance were best reflected by a single factor for females and as separate factors for males. Indeed, a previous study examining an abbreviated measure of character strengths also noted gender differences in the factor structure of character strengths (Vanhove et al., 2016). Taken as a whole, the invariance tests show that the GAT functions well in different subgroups and, coupled with the psychometric evidence at hand, findings support the continued use of the GAT as a psychosocial assessment tool that can inform Army resilience-building programs.

Convergent and Discriminant Validity Findings

The third and final piece of psychometric evidence comes from tests of convergent and discriminant validity involving the 11 resilience and four character strengths factors. Factors reflecting positive and beneficial skills (e.g., Self-Management, Positive Affect) were associated inversely with factors reflecting negative com-

petencies (e.g., Depressive Symptoms, Negative Affect). The convergence among the character strengths factors underscores the conceptual similarity of the character items, whereas the divergence among the resilience competency factors supports the multidimensionality of the GAT.

Generally speaking, competency reflects an ability to apply adaptive coping skills, including adapting to changing situations, avoiding strategies that subterfuge one's emotions, feeling hopeful, and avoiding the expectation that everything will turn out poorly. As expected, this pattern of thinking was associated with positive mood, and more engagement, trust, and meaning. Soldiers who reported higher competence, such as positive affective mood (e.g., cheerful, excited), reported stronger character strengths, and they found their military service more engaging and meaningful. In contrast, soldiers lacking character strengths were more likely to report feeling lonely and depressed.

Consistent with predictions from learned helplessness theory, we found that soldiers making negative causal assertions about bad events (feeling hopeless) were more likely to report feeling depressed and lonely. This occurs when soldiers engage in self-blame for poor outcomes and ascribe negative outcomes to internal, stable, and global characteristics (e.g., "Things will always go poorly, no matter what I do"). Likewise, soldiers who reported negative affective mood also lacked warmth, reported more depressive symptoms, were lonely, and felt disengaged with and untrusting of their peers and the Army.

In designing the GAT, the Army felt strongly that character strengths specifically herald a soldier's well-being, essentially reinforcing the importance of morals, ethics, and virtues as part of a soldier's credo and resilience. In support, we found important and consistent relations between character and resilience measures, including Intellect, Warmth, and Civic Strengths relating to less Loneliness and greater Meaning and Self-Management. Intellect was also positively associated with Work Engagement, a sign that creatively engaged, curious, and knowledge seeking soldiers are committed to the work they are doing in the Army. Overall, the pattern of associations for the character factors indicates that a soldier's well-being is inextricably tied to his or her sense of belonging and trust in the Army's organizational climate.

Future Directions

Efforts to examine the GAT's psychometric properties can inform future refinement of the instrument. In the present study, a subset of items demonstrated suboptimal fit when only one or two items on a scale were worded in a particular direction (i.e., optimism, loneliness, adaptability) or designed to capture a specific aspect of a construct (e.g., avoidance on the emotion-focused coping scale). In addition, the poor performing scales also tended to be relatively short in length (all three to four items). Among the scales in which suboptimal items were retained (loneliness and emotion-focused coping), suboptimal fit was also observed in the higher order factor analysis. Future efforts to refine the GAT should consider expanding the poor performing scales in order to more adequately assess the desired constructs. Strengthening the GAT may entail first lengthening certain scales to improve scale reliability, and then purifying the item content to better capture the intended facets of resilience or character. By following this strategy, Army leadership can include a more variegated representation of resilience including new psychometrically refined scales that bolster external validation efforts.

Limitations of the Study

There are several limitations of the present study worth noting. First, the GAT was designed to be a self-report inventory assessing psychosocial well-being, and reliance on a single method of reporting introduces some method variance. Although we examined within and between the resilience and character strengths domains, future studies would benefit from incorporating externally valid measures and using multi-informant procedures (e.g., officer ratings), which can strengthen conclusions about the GAT's psychometric properties.

Furthermore, we conducted all of our tests with cross-sectional data, providing only a single snapshot of the underlying factor structures. An important question is whether the factor structures obtained are consistent over time. Tests of measurement invariance are stronger when they assess whether a particular factor

retains its meaning over time (e.g., longitudinal stability; Dimitrov, 2010). Future studies can address developmental change in factor structures by using prospective data, examining changes in scale and latent mean scores, and, if possible, inspecting which elements of military life (i.e., combat) specifically contribute to these changes.

We also focused our analyses on Active Duty soldiers, excluding Reserve and National Guard soldiers, who constitute over one half of the Army. Reservists tend to be older, albeit both National Guard and Reservists participate in similar monthly training exercises and share similar military duty requirements. Given the widespread use of the GAT, future research should examine whether the identified GAT factor structures hold for these components as well. Future studies may also want to further examine measurement invariance based on additional Army-relevant subgroups. This might include contrasting soldiers based on military occupational status and deployment status (previously deployed vs. never deployed) as a means to establish whether military experience and exposure to combat influence psychosocial fitness and job performance.

Conclusion

Evidence is now accumulating that the GAT provides a psychometrically sound and valid means of assessing a broad array of competency skills, affective states, and cognitions, as well as specific qualities of character and leadership integral to Army life. Taken together, the factorial validity, measurement invariance, and convergent and discriminant validity findings represent an important milestone in the development, refinement, and further application of the GAT. Useful extensions of these findings can now consider relations of these factors with important markers of military success (e.g., early promotion), as well as various benchmarks of mental and physical health and readiness (e.g., medical and behavioral health diagnoses). The growing body of evidence supporting the GAT's psychometric utility may also serve to further strengthen the scientific credibility of the CSF2 program initiative.

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