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Stress, hardiness and eating disorder symptoms in military academy cadets

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ABSTRACT

Eating disorders are a persistent and debilitating problem, especially among college age men and women. This problem is exacerbated in occupations such as the military, where maintenance of strict standards regarding weight, fitness and appearance is important for job retention and promotion. Also, previous research confirms that stress is a contributing element to eating disorders. It is thus important to identify factors that may assist individuals to remain resilient and avoid stress-related health and eating difficulties. The present study utilizes historical data to examine the impact of stress on health and eating disorder symptoms in a representative sample of West Point military academy cadets, while testing the role of gender and hardiness as stress moderators in this relation. A survey containing measures of stress, hardiness and eating disorders symptoms was completed by 387 cadets in the fall and spring of 2000–2001. Moderation effects were tested with advanced conditional process analysis procedures developed recently by Hayes (2022). Results show that hardiness was a significant moderator, with cadets low in hardiness showing increased eating disorder symptoms and more general health symptoms. While gender was not a significant moderator with respect to eating disorder symptoms, it was significant for general health symptoms; female cadets showed more stress-related health symptoms than their male counterparts. These results suggest that eating disorder symptoms in military academy cadets and college students more generally may be reduced through programs aimed at developing hardiness attitudes and stress coping approaches.

CLINICAL IMPLICATIONS

- Perceived stress is a significant contributing factor to eating disorders and other health problems among military academy cadets.
- Women cadets are at especially high risk for eating disorders and health problems.
- Cadets low in the psychological qualities of hardiness are at even higher risk for stress related eating disorders and other health symptoms, and should be targeted for specialized support programs to strengthen hardiness attitudes and coping strategies.

Eating disorders and related problems represent a significant health threat, especially in the college age population (Claydon & Zullig, 2020). For example, in a study of students from a large Midwestern university, 13.5% of women and 3.6% of men screened positive for eating disorders (Eisenberg et al., 2011). A larger study looking at nearly 10,000 students from across 12 U.S. colleges and universities found 17% of women and 5.5% of men to be at risk for eating disorders (EDs), with even higher percentages of both sexes reporting “compensatory behaviors” aimed at reducing weight, including self-induced vomiting, taking laxatives, diuretics or diet pills, or compulsive exercising (Lipson & Sonnevile, 2017). In this study, weight status (being overweight) was the most consistent predictor of risk for eating disorders. Also, in their review of recent literature on eating disorders on college campuses, Fitzsimmons-Craft et al. (2019) found a majority of studies showed higher prevalence rates among college students compared to the general population. Further, these authors noted a substantial “treatment gap,” in that among students screening positive for eating disorders, only 20% or less received any form of treatment.

The growing risk of eating disorders among young people, and women in particular, may be due in part to their greater concern with body image (Faith et al., 1997; Schulken et al., 1997). This in turn is influenced by media representations of thin models and ideal types (Derenne & Beresin, 2006). For individuals who may be inclined to compare their body images with others, this can lead to increased body dissatisfaction, desire for thinness, and disordered eating (Derenne & Beresin, 2018). In recent years, the urge to compare one’s own body image with that of culturally-defined ideals has been further magnified through the use of social networking sites such as Facebook, Instagram and Snapchat (Holland & Tiggemann, 2016; Mabe et al., 2014). The easy availability of sophisticated cameras and photo editing software on smartphones has led to development of a “selfie culture” in which people strive to present themselves in the best possible light (Derenne & Beresin, 2018). Young people especially experiment with different poses, angles, filters and cropping in an effort to create the most flattering photos of themselves to share with their digital social networks as well as the public. For example, TikTok provides a filter (driven by AI—artificial intelligence) that can make faces appear thinner, and Instagram offers similar filters to adjust facial features to fit an ideal ratio template (Well, 2023). Editing selfie photographs to make oneself look better is getting more common especially among young people. In one study of 175 young women in the United Kingdom, 90% reported using filters or editing to trim off weight, smooth out skin, whiten teeth, and even reshape noses (Gill, 2021). Another study found that among 18–30 year old women, more time spent editing selfies was associated with more negative mood and facial dissatisfaction (Tiggemann et al., 2020). Increasingly, young people report feeling under pressure to look perfect and attractive, leading to anxiety and depression for many (Gill, 2021).

Military personnel are at greater risk for eating disorders

Prior research has shown that military personnel are likewise at high risk for eating disorders, in part due to the heavy institutional emphasis that is placed on weight, fitness, and body appearance (Antczak & Brininger, 2008; Bodell et al., 2014). According to one study of active duty military women, 33.6% scored in the at-risk range on the Eating Disorders Inventory (Gamer et al., 1983; Lauder et al., 1999). In a review, the percentage of female military cadets at risk for eating disorders ranged from 20 to 29.6% across studies (Bodell et al., 2014). The estimates are lower for male cadets, ranging from 2 to 7%, but this still represents a significant number of men with disordered eating.

Military cadets are young men and women who are attending college at one of the nation's three military academies: the U.S. Military Academy at West Point, New York, the U.S. Naval Academy at Annapolis, Maryland, or the U.S. Air Force Academy in Colorado Springs, Colorado. In return for a fully paid 4-year college education and Bachelor's degree, students agree to serve 5 years in the military. They generally have no prior military experience, and along with academic classes they also receive training in military skills and leadership. Also, students at non-military colleges who have enrolled in ROTC (Reserve Officers Training Program) are referred to as cadets. They receive military training along with their college education.

For several reasons, military cadets may be at greater risk for problems around eating. First, they are in the college age group of 18–21 year olds, a group known to be at high risk for eating disorders (Daly & Costigan, 2022). Also, the military places heavy emphasis on professional appearance both in and out of uniform, as well as holding to strict standards for weight, fitness and body fat (U.S. Army, 2006). These factors are even more heavily stressed for military academy cadets, as the curriculum is specifically designed to inculcate these values into the students. At the U.S. Military Academy—West Point, cadets are checked periodically via the Army Physical Fitness Test (APFT) and the Army Weight Control Program (AWCP; U.S. Army, 2006). The APFT stipulates standards for number of push-ups and sit-ups, and a 2 mile run time that for most cadets requires practice and constant effort to maintain fitness (this was modified in 2020 to the “Army Combat Fitness Test”, which includes several strength and endurance tasks; Headquarters, U.S. Army, 2020). The AWCP sets forth standards for Body Mass Index and percent body fat that all Army cadets must meet in order to remain at the academy. In addition, all cadets are required to participate in sports, either at the inter-collegiate or intramural level. There is consistent evidence in the literature showing that athletes are more vulnerable to eating disorders, and female athletes are especially at risk (Thompson & Sherman, 2011). This is more true in sports that require low body weight or leanness, such as swimming, gymnastics, rowing or cross-country (Joy et al., 2016). Combined with the emphasis on

weight control at West Point, the sports participation requirement would seem to place cadets at further increased risk for eating disorders.

Previous studies of military cadets have also shown high risk for eating disorders. In a study of ROTC cadets from three southeastern U.S. universities, 32% were found to be at risk for eating disorders (Smith et al., 2020), as indexed by the EAT-26 (Eating Attitudes Test-26; Garner et al., 1982). The same study also showed that women cadets were significantly higher than men in the use of laxatives, diuretics and diet pills. A large study of 12,731 West Point cadets over 7 years also found frequent disordered eating behaviors among cadets, including bingeing and purging, use of laxatives, supplements and diet pills for weight control (Beekley et al., 2009). These authors also tabulated clinical diagnoses of eating disorders, and identified bulimia nervosa (1.2%) and maladaptive eating (2.7%) as the most common diagnoses in female cadets. In a study of female ROTC cadets drawn from multiple colleges across the U.S., results showed 20% to be at risk for abnormal eating behaviors (Lauder & Campbell, 2001). Among those at risk, the most frequent abnormal eating behaviors were use of diet pills (55%), bingeing (19.3%), and purging (19%). While they did not specifically address the potential contribution of stress to disordered eating in cadets, Lauder & Campbell refer to their earlier study in which the recognized pressures of a military lifestyle appear to impact the individual's nutritional status (Lauder et al., 1999).

Stress contributes to eating disorders

Another risk factor for eating disorders is exposure to life stress, including traumatic stressors. Several studies have found that various types of traumatic stress are associated with eating disorders including bulimia nervosa and binge eating (Mitchell et al., 2012; Tagay et al., 2014). Other studies have also found that previous exposure to trauma and stress is linked to eating disorders in both military and civilian populations (Brewerton, 2007; Forman-Hoffman et al., 2012). Looking at military women specifically, Jacobson et al. (2009) found that women who deployed and experienced combat were nearly twice as likely to develop an eating disorder as those who deployed but did not experience combat.

It is fairly well documented that stress is a contributing factor to eating disorders among college students. For example, Ruggiero et al. (2008) reported that academic stress led to a direct increase in eating disorder symptoms of bulimia nervosa, body dissatisfaction and drive for thinness among female students in Italy. Similarly, a study of 3,457 French university students found that eating disorder risk was associated with greater perceived stress, and also with depression and alcohol abuse (Tavolacci et al., 2015). A later study by the same group found anxiety and stress levels highest among students diagnosed with eating disorders, especially bulimia nervosa and hyperphagic eating disorders (Tavolacci et al., 2020). Stress is also a major contributor to eating

disorders in adult, non-college samples (Troop et al., 1998). This latter study also showed that women with eating disorders were more likely to use avoidance coping in dealing with stressful problems.

The West Point environment presents cadets with multiple stressors on a daily basis. From the day they arrive, new cadets are placed in situations that are designed to be both physically and emotionally stressful (Lewis, 2019). This is by design, since it is understood that as young military officers they will need to perform as leaders in situations of extreme stress and hardship, including combat. They are stripped of their civilian identities, given uniforms and haircuts, and are addressed as “new cadets” and not by name. Cadets lose most of their freedoms, and assume a highly regimented lifestyle in which they are told where and when to be virtually every minute of the day (Gold & Friedman, 2000). Any failure to conform to the rigid schedule and dress regulations brings quick and stern reprimand from upperclass cadets and military training officers (Insider Business, 2018). Cadets endure long and busy days, starting with mandatory wake-up at 5:20 a.m., and usually not ending until “lights out” at midnight. During this time, cadets must balance multiple demands in terms of military training, academic study, and physical conditioning and sports. Contact with families is extremely limited, and they are restricted to campus most of the time. Sleep deprivation is common (N. L. Miller et al., 2010). By one fairly objective measure (wrist-worn actigraphy monitors), new cadets get an average of only 5 hours and 40 minutes of sleep per night (D. B. Miller, 2005). While this improves somewhat as cadets gain seniority, they are chronically sleep deprived while at the academy. Adding further to the stress, mandatory meals are highly ritualized and time limited. Although the food is plentiful, junior cadets are frequently peppered with questions from upperclass cadets throughout the meal, and are required to serve the upperclass cadets at their table (O’Donnell, 2017). Taken together, all these factors make for a highly stressful environment for cadets, which may contribute to eating disorders as well as other stress-related physical and mental health symptoms.

In fact, a cross-sectional study of West Point cadets found that perceived stress was related to lower feelings of well-being in the areas of work satisfaction, information processing, and nutrition (Myers & Bechtel, 2004). In addition, a study by Johnson et al. (2014) found that stress in the military environment was associated with increased eating disorders. Like all active duty U.S. Army personnel, West Point cadets must comply with strict weight, body fat and fitness requirements, as specified in Army Regulation 600–9 (Headquarters, Department of the Army, 2019) and Army Field Manual 7–22 (Headquarters, Department of the Army, 2020). They are under constant supervision, and are formally tested twice a year. This heavy emphasis on meeting weight, fitness and appearance standards appears to increase the risk for eating disorders among military personnel, according to a review of relevant studies (Bodell et al., 2014). These authors also conclude that prior

history of stress and exposure to trauma may be increasing the risk for eating disorder symptoms in those who choose to join the military.

Psychological hardiness as a protective factor

In considering factors that might be protective against stress-related disordered eating, the concept of psychological hardiness merits attention. Hardiness is a personality style or mindset that contributes to resilience under stress (Eschleman et al., 2010; Stein & Bartone, 2020). People who are high in hardiness have a strong sense of *commitment* and purpose in life, a belief that they can *control* or influence outcomes, and tend to regard changes and difficulties in life as *challenges* to confront and learn from (Bartone, 2006). Hardiness has been identified as contributing to stress resilience in many occupations, including executives (S. Maddi & Kobasa, 1984), bus drivers (Bartone, 1989), nurses (Abdollahi et al., 2014), police (Allison et al., 2019), college students (Hystad et al., 2009), and military personnel (Bartone, 1999; Britt et al., 2001), as well as military cadets (Bartone & Roche, 2023).

Although hardiness is relatively stable over time and across situations, there is now good evidence that hardiness levels can be increased as a result of experiences and training (S. R. Maddi et al., 1998, 2009; Stein & Bartone, 2020). Rather than an immutable trait, hardiness is better understood as a generalized style of functioning that continues to be shaped by experience and social context. It includes cognitive, emotional, and behavioral features, and characterizes people who stay healthy under stress in contrast to those who develop stress-related problems. The hardy person is courageous in the face of new experiences as well as disappointments, and tends also to have a strong sense of self-efficacy or personal competence (Vasudeva et al., 2006). The high hardy person, while not immune to the ill effects of stress, is robust and resilient in responding to stressful conditions.

Women at higher risk

As an additional risk factor, it has long been observed that women experience a higher incidence of eating disorders than men. For example, a systematic review of 94 studies conducted from 2000 to 2018 looking at eating disorders diagnoses found a lifetime prevalence of 8.4% in women, but only 2.2% for men (Galmiche et al., 2019). While psychosocial factors such as media-influenced desire for thinness certainly play a role in accounting for this difference (eg., Keel & Forney, 2013), studies have also implicated biological factors such as hormone-driven activation of genetically-based influences on neural responses to food and eating cues (Culbert et al., 2021). It is also recognized that various kinds of stress can have a differential impact on women, increasing their risk for eating disorders (Bekker & Boselie, 2002; Troop et al., 1998), as well as other kinds of mental and physical health problems (Gill, 2021; Tavoracci et al., 2015; Van Wijk & Kolk, 1997;

Weekes et al., 2005). Thus, the potential impact of gender and perceived stress on eating disorders in the young adult population merits further investigation, and may indeed prove important for prevention and treatment efforts.

The present study will explore the prevalence of eating disorder symptoms in a cross section of West Point cadets from the entire student body (freshman, sophomores, juniors and seniors), as well as the potential influence of perceived stress on eating disorder symptoms as well as health symptoms in general. In addition, we will evaluate the potential role of gender and personality hardiness as moderators in the stress—symptoms relation. We expect that hardiness levels in cadets will moderate the impact of stress on eating disorder symptoms as well as health in general. This leads to the following hypotheses to be tested in this study:

H_{1a}: Greater perceived stress is associated with increased eating disorder symptoms in cadets

H_{1b}: Greater perceived stress is associated with increased general health symptoms in cadets

H_{2a}: Gender moderates the relation between perceived stress and eating disorder symptoms

H_{2b}: Gender moderates the relation between perceived stress and general health symptoms

H_{3a}: Hardiness moderates the relation between perceived stress and eating disorder symptoms

H_{3b}: Hardiness moderates the relation between perceived stress and general health symptoms

Methods

Previously unpublished historical data from the U.S. Military Academy, West point were accessed for the current analyses. Data were collected as part of a cadet senior honors project, approved by the Office of Institutional Research and Associate Dean for Academic Research, U.S. Military Academy. A paper-and-pencil survey instrument was administered in 2001–2002 to assess perceived stress levels, hardiness, eating problems and health symptoms in a cross section of cadets drawn from the entire student body. Recruitment of subjects for the study proceeded as follows. Four companies were chosen at random, one from each of the four regiments that make up the Corps of Cadets. Each cadet company contains approximately 120 cadets, including freshman, sophomores, juniors and seniors. Participants were recruited at regular meetings of the cadet companies in a classroom setting, where the second author (KHT) explained the details and purpose of the study. As well, participants were informed that the survey would remain anonymous, and that their chain-of-command would not be able to see their responses. Volunteer participants were provided with an informed consent statement which included information on who to contact if they had any concerns about eating disorders in themselves or someone they knew. Of the approximately

480 cadets in the four companies targeted, 387 completed usable surveys for an estimated response rate of 80%. These participants closely matched the entire Corps of Cadets in terms of demographics, with 14% female and 86% male, and a mean age of 20.55 (range 18 to 25). All four classes were represented, with 18.8% seniors, 23.2% juniors, 27.9% sophomores, and 30.2% freshmen. Although we did not collect data on race, this is not considered a serious limitation since studies show that people of various ethnicities experience eating disorders at similar rates (Cheng et al., 2019; Shaw et al., 2004).

Measures

Stress was assessed with 7 items specially developed for this study. Respondents were asked to rate how high or low they perceived the demands to be in the current academic year, in each of seven domains: military, academic, physical, family life, social life and relationships, time/schedules, and overall/life in general. Perceived demands in each of these areas were rated on a five-point scale from very low to very high. Cronbach's alpha was .79.

Hardiness was measured with the DRS-15 Dispositional Resilience Scale (Bartone, 1995; Bartone et al., 1989). This scale encompasses the hardiness facets of commitment, control, and challenge. Items are scored on a Likert scale from 0 (not at all true) to 3 (completely true). Sample items are "Most of my life gets spent doing things that are worthwhile" (commitment); "By working hard you can always achieve your goals" (control); and "Changes in routine are interesting to me" (challenge). A previous study found the three-week test-retest reliability coefficient for this scale to be .78 (Bartone, 2007). In the present sample, Cronbach's alpha was .75.

Eating disorders

Symptoms of eating disturbance and disorder were assessed with the EAT-26 (EAT-26; Garner et al., 1982). Participants rated the extent to which each of 26 statements is true for them on a six-point scale, from never to always. Examples are "I am terrified about being overweight," "I vomit after I have eaten," and "I find myself preoccupied with food." Responses are summed to obtain a total score, indicating extent of disordered eating. Cronbach's alpha in the present sample is .90.

Health symptoms

A self-report symptoms checklist was included to measure physical and mental health complaints. The original 20-item scale was developed by Bartone et al. (1989). According to the authors, the symptoms checklist covers somatic symptoms (eg., headaches; common cold or flu; shortness of breath), symptoms of anxiety (eg., nervous or tense; rapid heart beat; muscle twitching or trembling), and depression (eg., feeling life is pointless or meaningless; crying easily; overly

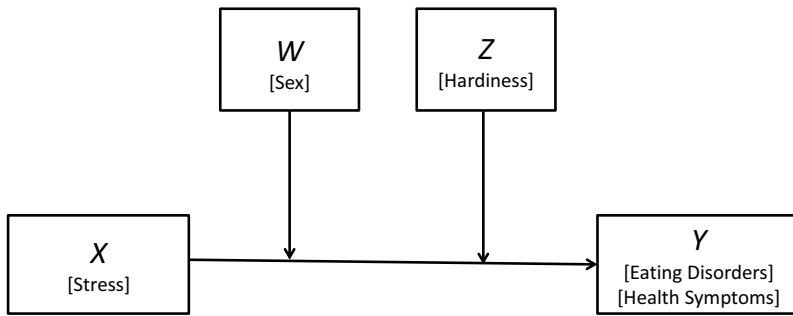


Figure 1. Model showing hypothesized moderating influence of gender and hardiness on the stress—eating disorders, health symptoms relations.

tired, lack of energy). For the present study, five items were added to cover additional common health issues (back pain, allergies, urinary tract infections, joint injury, overeating). Cronbach's alpha is .90 in the present sample.

Statistical analyses

Using the IBM SPSS statistical package, first order correlations among the study variables were assessed with the Pearson correlation statistic, with two-tailed probabilities. To evaluate moderation, we used the Hayes (2022) PROCESS plug-in for SPSS. The PROCESS program uses ordinary least squares regression to test for all effects in a model, and generates bootstrap confidence intervals that represent the sampling distribution for conditional effects in moderation models. Bootstrap confidence intervals yield more accurate inferences for indirect and conditional effects that are less influenced by sampling distribution irregularities, as compared with traditional tests (e.g., Baron & Kenny, 1986) based on normal theory (Hayes, 2022). In the PROCESS analyses, we used Hayes' model 2 which tests for two separate moderators (W and Z) in the relation between the predictor (X) and outcome (Y) variables. In our case, W = gender, Z = hardiness, X = stress, and Y = eating disorder symptoms followed by general health symptoms. The general model to be tested is shown in Figure 1. For all models, effects were estimated using 5,000 bootstrap samples with a 95% confidence interval, and continuous variables were mean centered to facilitate interpretation.

Results

According to Garner et al. (1982), scores of 20 or above on the EAT-26 scale mark an individual as at-risk for eating disorders. By this criterion, in the present sample 16.7% of female cadets and 1.8% of male cadets were at risk for eating disorders.

Correlates of perceived stress

As shown in Table 1, eating disorder symptoms were positively correlated with perceived stress ($r = .22, p < .001$) and gender (women are higher; $r = .40, p < .001$), and negatively correlated with hardiness ($r = -.21, p < .001$). A similar pattern was seen with respect to general health symptoms. In addition to eating disorder symptoms, female cadets also reported more general health symptoms ($r = .28, p < .001$) and higher perceived stress levels ($r = .23, p < .001$). Stress was linked to increased eating disorder symptoms ($r = .22, p < .001$) and more general health symptoms ($r = .37, p < .001$), providing support for H_{1a} and H_{1b}. Eating disorders are relatively highly correlated with general health symptoms ($r = .48, p < .001$). The only correlation with age was with gender, showing that male cadets were slightly older as a group than their female counterparts ($r = -.17, p < .001$).

Moderation analyses

Results for the conditional process (moderation) analysis for eating disorders are displayed in Table 2. The overall model was significant, with $F(6,363) = 20.59 (p < .001)$ and $R^2 = .25$. As predicted, perceived stress was associated with more eating disorder symptoms (H_{1a}), and hardiness was a significant moderator in this relation (H_{2b}). However, the moderation effect for gender was not significant (H_{2a}). The covariate age was not significant in the model.

Table 3 shows the results of the conditional process analysis for general health symptoms. Again, the overall model was significant, with $F(6,367) = 26.46 (p < .001)$ and $R^2 = .30$. As predicted, perceived stress was associated with

Table 1. Means, standard deviations, and correlations among the study variables.

	Mean (SD) N	Age	Gender	Hardiness ($\alpha = .75$)	Stress ($\alpha = .79$)	EATS-26 $\alpha = .90$	Health Symptoms $\alpha = .90$
Age	20.55 (1.38) 384	1.00					
Gender	.14 (.481) 384	-.168*** 384	1.00				
Hardiness	26.15 (5.59) 373	.016 371	-.055 371	1.00			
Stress	17.33 (4.86) 384	-.044 381	.234*** 381	.008 372	1.00		
EATS-26	23.48 (16.14) 387	.013 384	.402*** 384	-.210*** 373	.222*** 384	1.00	
Health Symptoms	13.05 (10.07) 386	-.004 383	.282*** 383	-.279*** 373	.371*** 384	.486*** 386	1.00

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; Two-tailed significance tests. Gender: 0 = male; 1 = female.

Table 2. PROCESS conditional effects of cadet stress effects on eating disorder symptoms with gender and hardiness as moderators.

Variables	<i>B</i>	SE <i>B</i>	<i>t</i>	<i>p</i>	LLCI	ULCI
Age	.693	.541	1.281	.201	-.3709	1.7579
Stress	.390	.163	2.388	.017*	.0689	.7109
Gender	14.510	2.573	5.640	.000***	9.4510	19.5701
Hardiness	-.554	.131	-4.216	.000***	-.8132	-.2159
Stress*Gender	.836	.516	1.620	.106	-.1789	1.8516
Stress*Hardy	-.092	.025	-3.712	.000***	-.1405	-.0432

$R^2 = .25$; $F(6,363) = 20.59$, $p < .0000$.

Note: *B* = Unstandardized beta coefficient; * $p < .05$, ** $p < .01$, *** $p < .001$; Age is entered as covariate; LLCI=Lower Level Confidence Interval for *B*; ULCI=Upper Level Confidence Interval for *B*.

Table 3. PROCESS conditional effects of cadet stress effects on General health symptoms with gender and hardiness as moderators.

Variables	<i>B</i>	SE <i>B</i>	<i>t</i>	<i>p</i>	LLCI	ULCI
Age	.248	.316	.783	.434	-.3744	.8701
Stress	.587	.097	6.071	.000***	.3970	.7774
Gender	3.584	1.529	2.344	.019*	.5776	6.5909
Hardiness	-.466	.077	-6.008	.000***	-.6181	-.3133
Stress*Gender	.755	.307	2.459	.014**	.1513	1.3585
Stress*Hardy	-.066	.015	-4.489	.000***	-.0947	-.0370

$R^2 = .30$; $F(6,367) = 26.46$, $p < .0000$.

Note: *B* = Unstandardized beta coefficient; * $p < .05$, ** $p < .01$, *** $p < .001$; Age is entered as covariate; LLCI=Lower Level Confidence Interval for *B*; ULCI=Upper Level Confidence Interval for *B*.

more health symptoms (H_{1b}), and this time both gender and hardiness were significant moderators (H_{3a} and H_{3b}). Again, the covariate age was not significant.

Significant interaction effects were probed using the “pick a point” approach as implemented in the PROCESS program (Hayes, 2022, pp. 264–268). For eating disorders, the moderating effects of hardiness were significant at the low and medium levels of hardiness for both male and female cadets (Figure 2). For health symptoms, hardiness was a significant stress moderator at low and medium levels for both male and female cadets, and for women cadets only, hardiness was also a significant moderator at high levels (Figure 3).

Discussion

As hypothesized, higher levels of perceived stress (demands) by cadets were associated with more eating disorder symptoms, as well as more health symptoms in general. Previous research has verified that experienced stress levels can be a contributing factor to eating disorders (Troop et al., 1998), and this may be especially true for women (Klatzkin et al., 2018; Moore & Cunningham, 2012). The military academy environment is indeed a stressful one for cadets, and female cadets face additional stressors as minorities in a traditional male dominated environment (Bartone & Roche, 2023). These

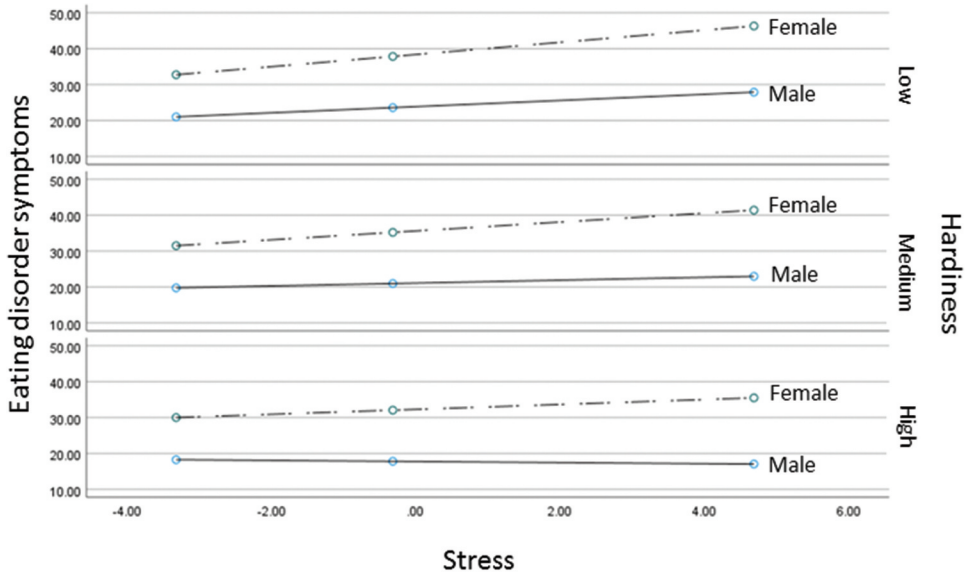


Figure 2. Moderation effects of gender and hardiness on the relation between stress and eating disorder symptoms in cadets.

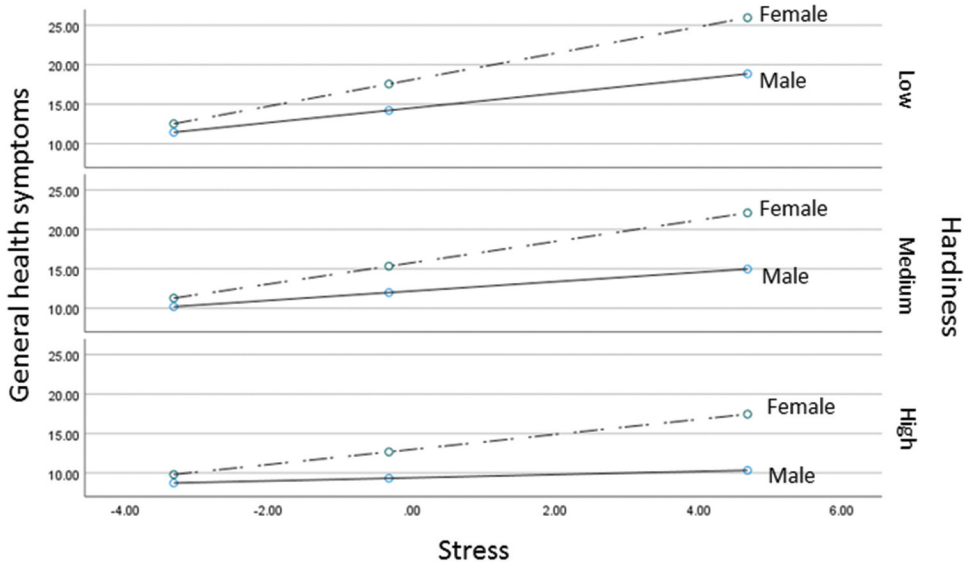


Figure 3. Moderation effects of gender and hardiness on the relation between stress and general health symptoms in cadets.

include constant scrutiny for fitness and trim appearance, a lack of female role models, and in some cases, gender-based harassment and abuse (Lewis, 2019). Given that rates of eating disorders among military personnel are generally comparable to civilian rates (Williams et al., 2018), the higher rates seen here among female cadets may simply reflect these same trends in the broader

culture. However, the large gap of 9:1 in EATS-based risk between female and male cadets seen here (16.7 vs. 1.8) is greater than what has been reported in the wider literature (Swanson et al., 2011). For example, using data from the National Comorbidity Survey Replication, Hudson et al. (2007) report women have a 1.75 to 3 times higher lifetime prevalence of eating disorders compared to men. While the present study measures *risk* for eating disorders and not actual diagnoses, the substantially higher risk for women lends some support to the idea that female cadets are experiencing additional stressors in the military academy environment that may be contributing to eating disorders and related dysfunctional behaviors. In addition, some of the higher levels of eating disorder behaviors seen in female cadets are likely due to pre-existing conditions that were present prior to entry into the military academy (Johnson et al., 2014).

It is worth noting that studies of eating disorders in the military have mostly focused on veterans, followed by active duty personnel, with even fewer studies on cadets (Bartlett & Mitchell, 2015), leaving many uncertainties regarding the true prevalence of eating disorders in the young active duty military population (which includes cadets). A further difficulty is presented by the fact that eating disorders in the military are grounds for separation (Office of the Under Secretary of Defense for Personnel and Readiness, 2020). Thus, it is likely that eating disorders and related behaviors are under-reported by military personnel (Touma et al., 2023). Since the present study used an anonymous survey, this should be less of a problem. However, it is still possible that cadets under-reported eating disorder symptoms for fear of reprisals.

Stress was also related to more general health symptoms in cadets, an association that is again more pronounced among women cadets. While the mechanisms by which stress can impact on health are not fully understood, the various hormones, glucocorticoids and catecholamines released as part of the stress response clearly play an important role (Ranabir & Reetu, 2011; Russell & Lightman, 2019). This has also been demonstrated with respect to eating disorders. For example, a recent review identified epigenetic changes in stress regulatory mechanisms that are linked to eating disorders, including bulimia nervosa, anorexia nervosa and binge eating (Chami et al., 2019). These changes in turn were associated with interpersonal and social stressors as well as history of adverse life events. It may be that cadets with a prior history of traumatic and stressful life events are more vulnerable to developing eating disorders when they get to the stressful military academy environment. It is also possible that some cadets who enter the military academy have pre-existing eating disorders, as has been found with military personnel more generally (Johnson et al., 2014). Unfortunately, we do not have the baseline data on entering cadets that would allow us to address this question. Future

research in this area should seek to determine history of disordered eating behaviors in cadets upon entry into the military academy.

As discussed earlier, military academy cadets experience additional stressors that are specific to the military occupation, and have been associated with eating disorders (Johnson et al., 2014). And as shown by Bodell et al. (2014), the pressure on cadets to always comply with strict military standards of weight, fitness and appearance appears to contribute to increased risk for eating disorders. Johnson et al. (2014) also note that among women who join the military nowadays, an increased number are overweight and/or have a history of abuse. The present results add further evidence to these findings, showing that the combined stressors experienced by cadets while at West Point (military, academic, physical, social) are associated with a significantly higher eating disorder symptoms (Hypothesis 1a) and health symptoms more broadly (Hypothesis 1b).

In the conditional process moderation analyses, results show that hardiness and gender have direct effects on eating disorder symptoms in cadets, with women and those lower in hardiness reporting more symptoms. However, only hardiness showed a clear *indirect* or moderating influence on the stress—eating disorders relation, providing support for Hypothesis 2b. Cadets low in hardiness were at increased risk for eating disorders (Figure 2). The hypothesized moderation effect for gender (Hypothesis 2a) was not supported, as this interaction was not significant. For general health symptoms, both gender and hardiness were significant stress moderators as hypothesized (H_{3a} and H_{3b}). Female cadets as well as those low in hardiness showed higher risk for health problems (Figure 3). The value of hardiness as a stress moderator or buffer has been noted in previous research with both military and non-military samples. For example, Escolas et al. (2013) found that hardiness moderated the effects of military occupational stressors on PTSD symptoms. Similarly, a study of U.S. Army soldiers returning from the Gulf War also identified hardiness as a buffer or moderator in the relation of combat stress on PTSD, with hardiness acting as a protective factor (Bartone, 1999). Studies also have found hardiness as a stress moderator with respect to other important outcomes, such as depression (Bartone & Homish, 2020) and alcohol abuse (Bartone et al., 2017; Kulak et al., 2021).

People who are high in hardiness tend to perceive demands and difficulties in life as part of the natural routine of living, and are generally confident they have the abilities to cope successfully with such challenges. Thus, difficult situations are seen as less stressful. Even when facing insurmountable problems or when failing at something, the high hardy person accepts the situation and treats it as a learning experience. For military academy cadets, daily life is tightly structured with little opportunity to exercise personal control. Although food is plentiful at dining hall meals, time to eat is usually short, and cadets are always aware of mandatory weight and fitness requirements. This

can generate anxiety around eating, leading many cadets to restrict their food and calorie intake. In fact, among the most frequently endorsed EAT-26 items by cadets were “I display self-control around food,” “I am aware of the calorie content of foods that I eat,” and “I think about burning up calories when I exercise.” Items also frequently endorsed by female cadets included “I am preoccupied with a desire to be thinner,” “I am terrified about being overweight,” “I am preoccupied with the thought of having fat on my body,” and “I eat diet foods.” Thus, in this sample of military academy cadets, reported eating disorder symptoms cluster around the issues of dieting, monitoring food and calorie intake, and maintaining acceptable weight.

A possible explanation for the present findings is suggested by multiple studies showing that the beneficial effects of hardiness are partly due to the coping strategies chosen by those high vs. low in hardiness. In dealing with stressful encounters, people high in hardiness tend to take an active, problem solving approach, while those low in hardiness rely more heavily on avoidance strategies (Bartone & Homish, 2020; Bartone et al., 2022; Eschleman et al., 2010; Thomassen et al., 2018). In this context, disordered eating behaviors, in particular overeating or binge eating, can be an avoidance coping strategy similar to drug or alcohol abuse (Bartone et al., 2017). For example, it may be that in dealing with the stress of military academy life, cadets low in hardiness may tend to avoid their difficulties by engaging in binge eating behaviors. If so, rather than solving problems, this would lead to undesirable consequences such as weight gain, peer disapproval and risk of dismissal. This in turn could encourage them to adopt unhealthy weight loss strategies such as purging and crash dieting. In support of this interpretation, 23% of male cadets and 30% of female cadets in the present sample report taking dietary supplements to lose weight. And while there was low endorsement of the EAT-26 item “I vomit after eating,” bingeing and purging behaviors may be underreported by cadets due to social desirability concerns and worries about the confidentiality of survey responses. In line with this interpretation, a study of over 12,000 West Point cadets found that while incidence was low, bulimia nervosa was the most common of clinically diagnosed eating disorders (Beekley et al., 2009). These authors also found that sub-clinical disordered eating behaviors were considerably more common among cadets, to include bingeing, bingeing and purging, and use of diet pills, laxatives and food supplements to control weight. Similarly, Bodell et al. (2014) reported that binge eating and purging were the most common eating disorder behaviors among military cadets, with purging behaviors evident in up to 5.2% across several samples of female cadets. Again, some of these behaviors may have existed prior to entering the military academy. However even in this case, disordered eating behaviors would likely only be exacerbated in the stressful military academy environment. Regardless, to the extent that disordered eating behaviors among cadets represent maladaptive efforts to cope with the pressures of the academy environment, more

positive and effective coping resources are needed in order to prevent or at least reduce these debilitating reactions.

A further explanation for the positive influence of hardiness lies in its more direct association with healthy habits. Previous research has shown that people high in hardiness also tend to follow good health practices including exercise and a healthy diet (Kobasa et al., 1982; Roth et al., 1989). While there is a shortage of research on hardiness and dietary habits, it makes sense that people high in hardiness would attend more carefully to their overall health activities including diet. To be high in hardiness commitment is to have a strong interest in the world and people around you, but also in yourself. Those high in hardiness show greater self-awareness and understanding of their own reactions and capabilities (Stein & Bartone, 2020). Thus, cadets high in hardiness may be more inclined to pay attention to activities that are health promoting, such as diet, exercise and sleep, within the constraints of the military academy world. It is also the case that cadets high in hardiness would tend to perceive their daily lives as overall less stressful, and so be less likely to engage in stress-related disordered eating behaviors. These are important areas for future research.

Limitations

This study has several limitations that should be noted. The design is cross-sectional, and so any inferences regarding causal directionality are tentative. A longitudinal design would provide greater confidence regarding the direction of effects. A further limitation is the lack of data on past history of disordered eating behaviors before entering the military academy. It is important for future studies in this area to include such baseline data in order to disentangle effects of the military academy experience from past history.

Data for the present study were collected as part of the second author's senior honor's research project in 2000–2001, under the supervision of the senior author. Given the time lag, it is conceivable that changes in the military environment or in students entering the military academy have occurred that would make the present findings less applicable to cadets of today. This is unlikely, considering that the prevalence of eating disorders both in the military and within the military academies have continued to rise (Bodell et al., 2014; Johnson et al., 2014). In addition, the stressors experienced by West Point cadets have not changed appreciably, particularly for women (Lewis, 2019).

Another potential limitation is the reliance on self-report questionnaire methods. Although respondents were assured as to the confidentiality of their responses, informed consent requirements necessitated obtaining names and signatures. Thus, some cadets may have been reluctant to report on health and eating disorder symptoms for fear their answers might be seen by supervisors, leading to medical referrals and a variety of negative

consequences. It is thus possible that both health and eating disorder symptoms were underreported in this study. In itself this is not considered a serious drawback, since a more accurate reporting of symptoms would most likely only increase the strength of the effects observed here.

Data on race/ethnicity were not collected for this study, which should be considered a limitation. Although eating disorders do not appear to vary by race (Cheng et al., 2019; Shaw et al., 2004), there is some evidence that black youth with eating disorders are less likely to seek treatment (Durham, 2022). Thus, future efforts to prevent, identify and treat eating disorders should pay greater attention to young people of color.

Conclusions and future directions

This study has demonstrated that for military academy cadets, perceived stress is a significant contributing factor to ill-health and eating disorder symptoms. In addition, women cadets are at somewhat higher risk for eating disorders and general health problems. More importantly, psychological hardiness was found as a significant moderator or stress buffer, with students high in hardiness at lower risk for eating disorders and related health problems. College administrators and educators might fruitfully explore the benefits of hardiness training programs for incoming students (Lifton et al., 2006), as well as educational environment adjustments aimed at encouraging more hardy, constructive approaches to dealing with academic stress (Bartone, 2006; Bartone et al., 2016; Hystad et al., 2009).

To the extent that disordered eating behaviors are a function of maladaptive stress coping responses, the cultivating of a hardiness mindset and positive coping strategies offers a promising adjunct to existing treatment and prevention efforts. Studies have shown it is possible to increase hardiness levels in various groups, to include managers, nurses, and college students (S. Judkins et al., 2006; Lifton et al., 2006; S. R. Maddi et al., 2009; Stein & Bartone, 2020). For example, using a small group format with multiple sessions spaced over four to six weeks, Maddi and colleagues found that college students showed significant increases in hardiness following the training (S. R. Maddi et al., 2009). The training is led by a hardiness coach or instructor who provides some background information about hardiness, and then guides the students through situational reconstructions of their actual stressful experiences and reactions. Following this, the student is asked to imagine alternative responses that might lead to better or worse outcomes (S. R. Maddi et al., 1998). After discussing the benefits of more positive, active problem-solving and coping approaches, students are encouraged to practice applying these strategies in their everyday lives. Throughout the training, students are reminded that difficult and stressful situations provide opportunities to learn and improve

their coping abilities. A more recent study finds that hardiness levels can be increased significantly through an activity-based intervention program lasting only 6 hours (J. Judkins et al., 2023).

Future studies in this area could seek to replicate the moderating effects of gender and hardiness identified here, extending this work to other cadet samples as well as civilian college undergraduates and using a longitudinal approach where feasible. In addition, the potential role of different coping strategies as mediators in the stress—hardiness—eating disorders pathway should be explored. There may be other mediators or moderators as well, such as history of trauma or major stressful life events. It is not established at this point to what degree, if any, military personnel who develop eating disorders experienced pre-existing problematic eating behaviors or other behavioral or mental health problems prior to joining the military. If this information can be determined, it can be used to inform more focused selection efforts for military personnel and cadets, as well as special support programs to assist applicants identified as being at higher risk for eating disorders.

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Data availability statement

Data for this study are available from the authors upon reasonable request.

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