Article

Fear/Anxiety and Sleep Deprivation Combine to Predict Courage

Jeffrey Alan Gibbons [*] , Brenna E. McManus , Ella C. White , Akihaya Mochizuki Gibbons

Article

Fear/Anxiety and Sleep Deprivation Combine to Predict Courage

Dr. Jeffrey A. Gibbons [1,*], Brenna E. McManus [1], Ella C. White [1] and Akihaya M. Gibbons [2]

[1] Department of Psychology at Christopher Newport University (1 Avenue of the Arts, Newport News, VA 23606)

[2] Department of Psychology at Virginia Polytechnic Institute and State University (Blacksburg, VA 24061-0002)

[*] Correspondence: jgibbons@cnu.edu; Tel.: 757-594-7256

Abstract: The current study examined the combined effects of sleep deprivation and anxiety on participants' willingness to act courageously in both heroic and everyday situations. Participants consisted of 256 undergraduate students between the ages of 18 to 25 years old seeking regular and extra credit for their psychology classes through SONA. Following informed consent, participants completed demographic questionnaires through Qualtrics, as well as the Depression Anxiety Stress Scale, the Pittsburgh Sleep Quality Index, and a version of the Woodard Pury Courage Scale-23 (WPCS-23). The Woodard Pury Courage Scale-23 measures participants' willingness to engage in challenging tasks that require either heroic or everyday courage and the fear they would experience when engaging in these tasks. The 6 measures of courage included willingness to engage in everyday, heroic, and both acts, as well as fear when engaging in these actions. Fear/anxiety by sleep interactions predicted every courage measure with the exception of fear when engaging in daily courageous actions. The results supported the hypothesis that fear/anxiety and poor sleep would combine to predict courage, and their implications are discussed.

Keywords: courage; anxiety; fear; sleep quality and quantity

1. Introduction

Few people choose to jump out of a perfectly functioning airplane or off a cliff, and even fewer individuals run into a burning building or throw themselves into the fray to help strangers in precarious positions on a daily basis, because these potentially harmful situations are scary, and they challenge the self-preservation instinct. Although heroism is rare, courage is displayed every day when people ask strangers for directions, stand up for themselves or someone else, or ask a question in a crowd. Courage is the act of overcoming the hardwired fear experienced by all animals that guides them to avoid or escape dangerous situations that can cause them harm (Rate, 2010; Rorty, 1986). In fact, acts likely cannot be truly courageous in the absence of fear, but high levels of fear clearly reduce courage (Rorty, 1986; Schueller & Parks, 2014). In addition, sleep-deprived individuals may be more likely to engage in risky situations than sleep-sufficient individuals, because sleep deprivation hinders mental clarity and decision making (Wei et al., 2024). For example, LoPresti et al. (2016) found that military personnel engaged in courageous actions when they were heavily sleep deprived. Although research has demonstrated that fear and sleep-deprivation each relate to courage, no study has evaluated the combined relation of fear and sleep deprivation as an interactive predictor of courage. Therefore, the current study examined the relations of fear, as measured by anxiety, poor sleep (both quantity and quality), and their combination as predictor(s) of everyday and heroic acts of courage.

1.1. Fear/Anxiety and Courage

Gal and Rucker (2021) determined that fear, in addition to purpose, agency, and availability, was viewed as a precondition for courage. Rachman (2004) defined courage as the willingness to act in the presence of subjective fear, and Chowkase et al. (2024) stated that fear is the driving factor of courage, making it the act of overcoming fear. Courage has also been defined as the ability to overcome one's fear when encountering obstacles that involve stressful or dangerous conditions (Rorty, 1986), and Rorty (1986) stated that traditional courage involves overcoming fear, as well as facing obstacles and risk. Cox et al. (1983) found that 7 decorated bomb-disposal operators performed more accurately and calmly in a stressful test than 7 undecorated bomb-disposal operators, and 7 civilian subjects used for a control. Similarly, McMillan and Rachman (1988) found that 105 paratrooper recruits in training reported increased confidence and decreased fearfulness over multiple jumps and Bowers et al. (2022) suggested that courage buffers individuals from feeling overly scared in very tense situations, helping them manage stress and anxiety. Schueller and Parks (2014) highlighted the importance of fear and anxiety for determining the presence of courage; they asserted that fear and anxiety foster courage by challenging individuals to act despite discomfort.

Norton and Weiss (2009) defined courage as action in the presence of fear, which emphasizes the importance of fear for the existence of courage. These researchers then examined the relation between courage, anxiety, and fear using a behavioral approach. The sample consisted of 31 female undergraduate psychology students (mean age of 22.13 years) who participated in a two-part study. The first part of the study measured spider fears via the Spider Questionnaire (Klorman et al., 1974) and the Spider Phobia Beliefs Questionnaire (Arntz et al., 1993). The second part of the study evaluated courage, as measured via a researcher-developed courage scale (Schueller & Parks, 2014), anxiety, as measured via the State-Trait Anxiety Inventory (Spielberger, 1983), and distress, as measured using the Subjective Units of Distress Scale (Wolpe, 1958). Participants were then presented with a spider and their spider fears were evaluated using a Behavioral Approach Test (BAT), which asked participants to place their hand as close to the spider as they were comfortable doing. Distance from the spiders was the fear/courage measure evaluated in the behavioral approach with far distances indicating high fear and low courage. The results showed significantly lower fear and higher courage during part one than part two of this study, which suggested that willingness to engage in courageous acts is strongly influenced by the degree of fear elicited by the situation in a negative way.

Chockalingam and Norton (2018) replicated the spider study, but they focused on the BAT as the main measure of fear/courage and evaluated the effect of expressed task importance on it. Again, long distances indicated high fear and low courage, and participants were randomly assigned to task-performance conditions using monetary incentives. The low task importance group was simply told that they would receive a $20 participation reward. The high task importance group was told that they would receive a maximum amount of $20 for their participation, but the amount received depended directly on how close they got to the spider, with each additional 3-centimeter move towards the spider earning an additional $1. Following the BAT, participants completed the Courage Measure (CM; Norton & Weiss, 2009) and the Subjective Units of Distress Scale (SUDS; Wolpe, 1958). The researchers found that large taxidermy tarantulas induced fear as every participant did not touch the fake spider, and, more importantly, distances from the spider were shorter for the high task importance group than the low task importance group. This result showed that fear plays an important weakening role in displays of courage. However, CM scores predicted BAT distance above and beyond distress, which indicates that courage helps individuals act in ways that help them overcome their fears.

Using the same fear-provoking spider task as the previously described studies, Eix (2021) examined the effect of a positive psychology intervention, known as exposure therapy, on acts of courage. The sample consisted of 96 undergraduate students (69.4% female) who were tested on their fear of spiders. Fear of spiders was measured using an adapted version of the Fear of Spiders Questionnaire (Szymanski & O'Donahue, 1995) and courage was measured using the Courage

Measure (CM; Norton & Weiss, 2009). Participants were randomly assigned to the positive psychology intervention, which involved an experimenter directly asking participants a number of therapeutic-styled questions regarding a scenario in which they encountered spiders, pertaining specifically to the behavior. The control condition consisted of another series of questions regarding a scenario in which they encountered spiders, but focused specifically on their current feelings.

For all the participants in the Eix (2021) study, the therapeutic intervention was followed by a sorting task. All participants then completed an exposure analogue in which they were asked to touch the live spider in different ways. After engaging in each method of touching the spider in which closeness to the spider was measured, participants reported courage scores using the CM. Each interview was rated for fearfulness (from 1 to 10), approach behavior (from 1 to 10), and courage (fear x approach/100). The results showed that the treatment intervention was effective in producing greater approach behavior and courage when interview fear ratings were used as a covariate. Much like the results of Chockalingam and Norton (2018), these results suggested that true courage helps individuals act in a way that allows them to overcome their fears.

Based on the literature showing that fear is a critical component of courage, the current study used the Woodard Pury Courage Scale 23 (WPCS-23; Woodard & Pury, 2007) because it used agreement and fear ratings to evaluate fear. Specifically, participants are provided with actions that would demand courage to engage in and they are asked to provide the degree that they would agree to engage in the action as well as the fear they would experience when engaging in the action. The WPCS also contained courageous actions that could be classified as heroic or everyday acts of courage, which were described by Pury et al. (2007) as general courage (courageous for everyone) and individual courage (courageous for the individual), respectively. Heroic actions included statements, such as "I would undergo physical pain and torture rather than tell political secrets" and everyday actions included statements, such as "I would seek out and ask a grocery store employee for help when shopping".

1.2. The Relations of Risky Decisions to Courage and Sleep Deprivation

The courage literature and the sleep deprivation literature do not examine nor describe a relation to the other body of work. However, each topic involves risky decision-making. As previously stated, courage is defined by risk (Lei et al., 2017; Wei et al., 2024). In addition, sleep deprivation leads to poor/risky decisions (LoPresti et al., 2016). To establish a relation between the two topics, we examined each of their connections to risky/poor decision-making.

1.2.1. Courage and Risky Decisions

Risky decision-making is a critical component of courage (Bowers et al., 2022; Norton & Weiss, 2009). In fact, Howard and Alipour (2014) found, when validating the Norton and Weiss (2009) Courage Measure (CM), that the measure of courage was positively and strongly correlated to risk-taking. Hawkins and Morse (2014) defined courage as ethical risk-taking across a variety of disciplines including the field of medicine. Pury et al. (2024) found that ratings of courage increased with risk-taking, but courage ratings were most strongly influenced by the degree participants agreed with the actions in scenarios describing LGBT+ issues including public gender transitioning and same sex marriage.

Risky decision making is enhanced by large rewards and high stakes. Wiseman and Levin (1996) found that risk-taking decisions increased with the degree of reward irrespective of whether the scenario was real or contrived. In a literature review, Gal and Rucker (2018) argued that many people try to maintain the status quo, but high stakes often necessitate risky decisions irrespective of context (e.g., investment, gambling, or theft). In a meta-analysis, Gal and Rucker (2021) determined that large rewards led to high risks and courage. The literature shows that risky decision making is an important part of courage and large rewards increase risky decisions and, hence, courage.

1.2.2. Sleep Deprivation and Risky Decisions

Although military personnel are known for their bravery on the battlefield (Bowers et al., 2022), they are also known to battle sleep deprivation alongside their enemy with the outcome being poor decisions (LoPresti et al., 2016). LoPresti et al. (2016) examined the effect of insufficient sleep on military performance in an anonymous survey of 679 Army soldiers deployed to Afghanistan and they discovered that insufficient sleep significantly increased the risk of accidents and mistakes, causing impulsivity, poor judgment, and unjustified risk. Sleep deprivation has been found to result in clouded judgment, decreased critical thinking skills, increased risk-taking, and reduced inhibitions in non-military samples as well (Örsa et al., 2012; Wei et al., 2024). For example, sleep deprivation has also been found in university students, who are historically known to be highly sleep deprived and impulsive (Örsa et al., 2012). In a study of 803 students evaluating overall anxiety and sleep quality, 74.5% of sampled university students reported poor sleep, which was related to risky behaviors, such as alcohol consumption.

Wei et al. (2024) conducted a review with 32 different studies evaluating the effects of sleep deprivation on risky decision making. A positive relation was found between sleep deprivation and risky decisions in 25 of the 32 studies using various tasks, such as the Ballon Analogue Risk Task (BART). The BART instructed participants to pump up a virtual balloon with the intent of a reward, but each pump increased the risk of the balloon popping, which resulted in the loss of a reward. Sleep-deprived participants were more likely to display risky decision-making in the BART procedure, as well as the Experiential Discounting Task, the Adjusting Amount Delay and Probability Discounting Task, and the Stop Task than non-sleep-deprived participants with the effect being stronger for men than women. Lei et al. (2017) used a modified BART to investigate the risk-taking behaviors in sleep-deprived people. Thirty-one adult men with habitually good sleep habits between the ages of 18 and 28 years old participated in the study. The analyses showed that sleep-deprived participants pumped more air into the balloon, indicating higher risk-taking, than other participants.

Instead of using the BART, Killgore et al. (2006) investigated the relation of sleep deprivation and risky decisions using the Iowa Gambling Task. The results showed that sleep-deprived men and women selected more cards from high-risk decks on the Iowa Gambling Task than male and female controls; this result was not moderated by sex. Csipo et al. (2021) used the CANTAB battery procedure to examine the effect of sleep deprivation on risky decision-making in 10 healthy men ranging from 24 to 31 years old who completed the CANTAB procedure. The study examined if sleep deprivation increased reaction time and reduced focus on the CANTAB. The researchers found, using Doppler scans, decreased activity in the left frontal gyrus for sleep-deprived individuals, which indicated lower risk control. Moreover, participants were more likely to make risky decisions after being sleep-deprived than after being well rested. The literature examining the relation between sleep deprivation and decision making consistently showed that sleep-deprived individuals demonstrated more risky decision making than non-sleep-deprived individuals.

1.3. The Current Study

The courage literature suggests that fear/anxiety is part and parcel of courageous actions (Shelp, 1984), because the act is not very courageous if the thought of engaging in that action does not elicit feelings of escape and avoidance (Rorty, 1986). As courage is not related to sleep deprivation in the literature, we investigated the links between risky decisions and both courage and sleep deprivation. This research showed that risky decision-making is positively related to both courage (Bowers et al., 2022; Norton & Weiss, 2009) and sleep deprivation (Örsa et al., 2012; Wei et al., 2024). Therefore, courage and sleep deprivation should be related through risky decision-making, but the courage literature has not established this relation, nor has it examined the combined effect of fear/anxiety and sleep deprivation as an interactive predictor of courage.

The current study was created to fill this void in the literature and evaluate the interactive relation of fear/anxiety and sleep measures on levels of heroic and everyday courage. As stated previously, we used the WPCS-23 to measure willingness to engage in and fear when experiencing

heroic and everyday acts of courage. We expected fear/anxiety to positively predict agreement-courage measures and negatively predict fear-courage measures, sleep hours to negatively predict agreement-courage measures and positively predict fear-courage measures, and poor sleep quality to positively predict agreement-courage measures and negatively predict fear-courage measures. Moreover, we expected the product of fear/anxiety and sleep hours and the product of fear/anxiety and poor sleep quality to negatively and positively predict courage measures, respectively. We also expected the products of fear/anxiety and sleep to predict courage measures over and above the individual relations of fear/anxiety and sleep deprivation to courage measures.

2. Methods

2.1. Participants

The original sample of the current study consisted of 256 undergraduate students ranging between the ages of 18 to 28 years old from a small liberal arts university in the southeastern United States. A total of 11 participants did not follow directions or provided incomplete information, which resulted in a final sample size of 245 participants. All participants were recruited through Sona Systems (SONA) to register student participation credit for regular and extra credit within their psychology classes at their university. Data for this study were collected between fall 2023 and spring 2024. Participants were predominantly women (162 women and 81 men), with 3 participants selecting "other" or "prefer not to say". Following recruitment, participants received an external link to complete an online survey through Qualtrics. Following participation, each participant received class credit. The study received approval from the internal review board (IRB; #1882669-1) of the university. According to IRB guidelines specified by the American Psychological Association (APA, 2023), participants were briefed, provided informed consent, and debriefed by the study's conclusion. Participants were allowed to leave the study at any time without penalty and all data were kept confidential to protect their individual privacy.

2.2. Materials and Measures

The materials for the current study included a consent form, demographics questionnaire, the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989), the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995), a modified version of the Woodard Pury Courage Scale (WPCS-23; Woodard & Pury, 2007), and a debriefing form. The consent form contained a briefing, general description of procedures, and provided contact information for the principal investigator, the university's IRB chair, and university counseling services. The consent form also provided a section for participants to digitally sign their names. The dependent variable in this study was courage, which was measured with the adapted Woodard Pury Courage Scale. The predictors in this study included sleep deprivation, as measured by the PSQI, and fear/anxiety, as measured by the DASS.

2.1.1. Demographic Questionnaire

Participants were asked to select the option that best represented them in relation to their race, gender, sexual orientation, religion, and age. All participants were given the option, "Prefer Not to Disclose", for each section if they wished not to disclose such personal information.

2.1.2. Modified Version of the Woodard Pury Courage Scale (WPCS-23)

The WPCS-23 is a self-report inventory used to measure each participant's willingness to engage courageously in fear-provoking situations as well as the resulting fear/anxiety caused by each engagement. The modified list of 20 questions consisted of two parts with each item providing a scenario (e.g., I would risk rejection by important others for a chance at achieving my life goals). Participants then provided the degree they disagreed/agreed with the statement on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) and indicated the level of fear they would expect to

feel in that situation rated on a scale ranging from 1 (*Little Fear*) to 5 (*Very High Fear*). A factor analysis was conducted to determine a two-factor structure with heroic and everyday courage factors.

The 10 heroic courage items (e.g., I would undergo physical pain and torture rather than tell political secrets) included 1-3, 5-9, 11, and 12. The 8 everyday courage items (e.g., I would meet with my supervisor at work about a problem I believed was important) included 4, 10, 13, 14, 15, 17, 18, and 19. Questions 12 and 20 were removed from further analysis as they did not contribute significantly to either courage measure. These two sets of questions were totaled for agreement courage statements and fear when engaging in these courageous situations, producing four courage measures. The totals were calculated for courage statements and fear statements, producing two additional measures. The Cronbach's alphas for heroic agreement courage, everyday agreement courage, total agreement courage, as well as fear when engaging in heroic, daily, and both heroic and daily courageous actions were .729, .704, .784, .845, .828, and .895, respectively.

2.1.3. Brief Depression Anxiety Stress Scale (DASS-21)

The brief Depression, Anxiety, and Stress Scale (DASS-21; Lovibond & Lovibond, 1995) was used to measure each participant's fear/anxiety as this variable is positively related to courage (e.g., Schueller & Parks, 2014). The questionnaire included statements about depression, anxiety, and stress in which participants rated the strength that each statement applied to them. Rating scale answers ranged from 0 (*did not apply to me at all*) to 3 (*applied to me very much or most of the time*). An example statement is "I felt I was close to panic". Certain items pertain to anxiety and these certain items were added and scored to indicate levels of anxiety. The scores from the items were averaged and Cronbach's alpha for the anxiety portion of the DASS-21 scale was calculated and it was .820.

2.1.4. Sleep

Participants were asked to report the number of hours they slept the previous night. The Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989) is a questionnaire that evaluates sleep quality and sleep disturbances with open-ended questions and Likert-type responses to statements. The questionnaire uses seven closed-ended ratings on a 4-point Likert-type scale ranging from 1 (*Not during the past month*) to 4 (*Three or more times a week*). Furthermore, participants were given a space to name any disturbances not named by the questionnaire, with a scale to provide the frequency the item was experienced. The scores from the items were averaged and Cronbach's alpha for the PSQI scale was .712.

2.1.5. Combined Fear/Anxiety and Sleep Measures

The combined fear/anxiety and sleep measures were calculated by multiplying fear/anxiety with each sleep measure. The first measure multiplied fear/anxiety by hours of sleep (quantitative) and the second measure multiplied fear/anxiety by poor sleep quality (qualitative via the modified PSQI).

2.3. Procedure

Participants signed up for the study online through the SONA system. As this survey was completed online through Qualtrics, participants then received an external link that took them to the digital survey. Participants were provided with a written briefing that depicted the risks or benefits of completing the study. All consent procedures concluded with contact information for the university's counseling center, the study's primary investigator, university IRB chair, as well as assurances that all collected data would remain confidential and not tied to their identity. Participants were presented with a series of basic demographic questionnaires, DASS-21, the modified PSQI, and the modified WPCS-23. The WPCS-23 is a two part scale in which participants are presented with a challenging behavior and asked the degree they willingly agree to engage in the behavior and the fear they would experience when engaging in that behavior. Following completion of each of the

questionnaires, participants were debriefed and researchers provided them with credit through SONA.

2.4. Design and Analyses

We used a cross-sectional design. We conducted correlational analyses of the individual relations between fear/anxiety, sleep, and the combined relation of anxiety/fear by the sleep measures to the willingness to engage in heroically, daily, and both heroically and daily courageous behaviors as well as the fear experienced when engaging in those behaviors. We also conducted standard multiple regression analyses with all the predictors for each of the six courage measures to determine if anxiety/fear by both sleep measures could predict unique variance in the courage measures above and beyond fear/anxiety and sleep.

3. Results

3.1. Correlations of Courage Measures and the Four Predictors

Heroic agreement courage was negatively correlated to hours of sleep, $r(212) = -.147$, $p = .032$, and the Fear/Anxiety x Hours of Sleep interaction, $r(212) = -.190$, $p = .005$. In addition, everyday agreement courage was negatively correlated to fear/anxiety, $r(210) = -236$, $p = .001$, the Fear/Anxiety x Poor Sleep interaction, $r(202) = -.195$, $p = .005$, and the Fear/Anxiety x Hours of Sleep interaction, $r(210) = -.249$, $p = .001$. Total (heroic and everyday) agreement courage was negatively correlated to hours of sleep, $r(205) = -.139$, $p < .05$, fear/anxiety, $r(205) = -.238$, $p = .001$, the Fear/Anxiety x Poor Sleep interaction, $r(197) = -.197$, $p = .005$, and the Fear/Anxiety x Hours of Sleep interaction, $r(205) = -.275$, $p < .001$.

Fear when engaging in heroically courageous actions was positively correlated to poor sleep quality, $r(195) = .250$, $p < .001$, fear/anxiety, $r(204) = .209$, $p = .003$, the Fear/Anxiety x Poor Sleep interaction, $r(195) = .295$, $p < .001$, and the Fear/Anxiety x Hours of Sleep interaction, $r(204) = .197$, $p = .005$. Fear when engaging in daily courageous actions was positively correlated to poor sleep quality, $r(198) = .295$, $p < .001$, fear/anxiety, $r(206) = .401$, $p < .001$, Fear/Anxiety x Poor Sleep interaction, $r(198) = .414$, $p < .001$, and the Fear/Anxiety x Hours of Sleep interaction, $r(206) = .371$, $p < .001$. Fear when engaging in heroically and daily courageous actions was positively correlated to poor sleep quality, $r(191) = .306$, $p < .001$, fear/anxiety, $r(199) = .345$, Fear/Anxiety x Poor Sleep interaction, $r(191) = .397$, $p < .001$, and the Fear/Anxiety x Hours of Sleep interaction, $r(199) = .318$, $p < .001$.

3.2. Regression Analyses of the Courage Measures Accounted for by the Four Predictors

The results of a stepwise regression Model 1 showed that the Fear/Anxiety x Hours of Sleep interaction, $B = -0.023$ ($SE = 0.008$), $t(203) = -2.822$, $p = .005$, negatively predicted 3.8% of the variance in heroic agreement courage. In addition, the results of a stepwise regression Model 2 showed that fear/anxiety, $B = -0.663$ ($SE = 0.187$), $t(201) = -3.540$, $p < .001$ negatively predicted 7.6% of the variance, and the Fear/Anxiety x Poor Sleep interaction, $B = 0.126$ ($SE = 0.062$), $t(201) = 2.038$, $p = .043$, positively predicted an additional 1.9% of the variance for a total of 9.5% of the variance in everyday agreement courage. Furthermore, the results of a stepwise regression Model 1 with the Fear/Anxiety x Hours of Sleep interaction, $B = -0.028$ ($SE = 0.007$), $t(197) = -4.186$, $p < .001$, negatively predicted 8.2% of the variance in total (heroic and daily) agreement courage.

The results of a stepwise regression Model 1 showed that the Fear/Anxiety x Poor Sleep interaction, $B = 0.126$ ($SE = 0.029$), $t(195) = 4.311$, $p < .001$, positively predicted 8.7% of the variance in fear when engaging in heroically courageous actions. The results of a stepwise regression Model 1 showed that fear/anxiety, $B = 0.565$ ($SE = 0.087$), $t(198) = 6.506$, $p < .001$ positively predicted 17.6% of the variance in fear when engaging in daily courageous actions. The results of a stepwise regression Model 1 with the Fear/Anxiety x Poor Sleep interaction, $B = 0.157$ ($SE = 0.026$), $t(191) = 5.972$, $p < .001$,

positively predicted 15.7% of the variance in fear when engaging in heroically and daily courageous actions.

4. Discussion

The goal of the current study was to examine whether fear/anxiety would combine with sleep measures (amount in hours and poor sleep quality) to predict unique variance in courage measures. Courage was defined as the willingness to be brave despite fear and it was measured by willingness to engage in heroic, daily, and both types of courageous acts, as well as fear when engaging in heroic, daily, and both types of courageous acts. Fear/anxiety combined with a sleep measure to predict five of the six courage measures, these interaction variables were the only predictor in four of the five analyses, and the secondary predictor of courage in one analysis. Therefore, the current study was very successful in terms of its main goal.

The findings suggest that sleep alone did not significantly predict courage in regression models also including fear/anxiety and the fear/anxiety by sleep interactions, which means that sleep did not influence courage on its own. Whereas this result seems to contradict past research showing that sleep deprivation was connected to risky/poor decision-making (e.g., LoPresti et al., 2016), which is positively related to courage (Bowers et al., 2022; Norton & Weiss, 2009), two facts might explain the different results. First, the studies demonstrating a relation of sleep deprivation to risky decision-making did not examine courage. Second, these studies did not examine sleep along with fear/anxiety and the fear/anxiety by sleep interaction as predictors of risk-taking or courage.

Although sleep deprivation alone did not influence courage, its combined effect with fear/anxiety consistently predicted courage. Based on the literature showing that sleep deprivation leads to risky decision making (e.g., LoPresti et al., 2016) and the research demonstrating that fear is necessary for courage (Chowkase et al., 2024; Rachman, 2004), the results of the current study suggest that poor sleep clouded participants' cognition (Csipo et al., 2021; Lei et al., 2017) and helped them ignore high fear levels and provide courageous responses. Future research should replicate and extend the method in current study using behaviors that demand courage, such as the BAT spider procedure, the BART balloon procedure, and the Iowa Gambling Task to determine if the results will extend to actual behaviors rather than imagined actions. Similar findings in these proposed studies to the results in the current study would provide credence for the speculation that sleep deprivation inhibits cognition to override fear and enhance courageous actions. Participants could also be asked if they think their sleepiness helped reduce their fear and increased their courage. Although participant responses could help confirm the cognitive clouding explanation, they cannot refute it because participants may not be aware of the effect even if it is occurring.

The results of this study can be used to help encourage or reduce courageous behaviors. For example, firefighters and police officers must engage in courageous actions, which could be high in newbies and low in journeymen/journeywomen or vice versa. Novice firefighters or police officers may show low levels of courage, and they should increase them. Alternatively, these individuals may show very high levels of courage, which could heighten their anxiety and impair their decision-making to increase their courage. Therefore, the goal would be to teach novices to match the willingness to engage in heroic and everyday courage and fear experienced when engaging in these acts of their supervisors and/or experts in the field.

Based on the results in the current study, sleep deprivation and fear/anxiety could be enhanced to increase courage, or they could be decreased to reduce courage. Many fields may be ahead of this suggestion as military personnel, police officers (Lopresti et al., 2016), firefighters, and emergency room doctors (Bowers et al., 2022) are often sleep deprived and their jobs demand courage. However, achieving higher courage levels than their supervisors or experts in the field could lead to overconfidence (Gal & Rucker, 2021) and poor decision making (Pury et al., 2024), which could be dangerous for them and the people who count on them to make solid decisions. Therefore, researchers would need to determine the levels of courage experienced by novices and experts in dangerous positions demanding courage using the modified version of the Woodard-Pury Courage

Scale. At that point, courage-increasing or -decreasing programs could be created using relevant fear-provoking situations and techniques that enhance sleep deprivation or sufficient sleep. The individuals could be trained in safe environments rather than learning on the job, which reduces risk for them and the public they serve.

The current study included some limitations. The first limitation for the current study was the sample size. Although we may have found additional effects with a larger sample than the one used in the current study, we found many significant effects that supported the goals and hypotheses in this study. However, future studies could increase the sample size to increase the power and improve the representativeness of the findings. Replication is another way to increase the representativeness and generalization of the results. Similarly, women comprised two-thirds of the sample in the current study, so future replications could increase the representativeness of the results with large samples containing equal numbers of men and women.

Another limitation was the design of the study, as the current study used a cross-sectional design; these studies can determine correlation, but not causation. Future experiments can manipulate sleep in a sleep lab and fear using movie clips and/or relaxation methods to assess the individual and combined effects of these variables on courage. The randomization of participants to conditions would also control for additional limitations involving habits that increase or reduce stress levels, such as smoking and busy schedules as well as exercise and meditation. As shown by Pury et al. (2024), political leaning strongly influenced determinations of courage in other individuals, which means that it could have affected the results in the current study. Therefore, future research should measure political leaning and other types of beliefs (e.g., religion) and statistically control their influence on courage.

In summary, the goals of the current study were achieved, and the hypotheses were supported. Specifically, poor sleep (in hours and overall sleep quality) did combine with fear/anxiety to predict unique variance both everyday courage and heroic courage. Although the current study successfully found that fear/anxiety combined with sleep measures to predict various measures of courage, future research should determine the mechanisms behind these findings. Further study on this topic may help researchers understand the optimal levels of courage in different settings as well as methods to achieve those levels of courage. To potentially apply these findings to real world settings, future research would first need to extend the procedures in the current study to novices and experts in particular fields (e.g., safety and medicine) and manipulate sleep and fear/anxiety to make novices more like experts. Future research should also control for personal beliefs, such as political leaning. Although the idea of being a fearless superhero seems enticing at first blush, the current study showed that we need fear to overcome, but we also may need a little brain fog to actually jump into threatening situations. Therefore, the conclusion of this work for now is that, as Captain Kirk told Bones in Star Trek: The Final Frontier, fear is needed as it helps us survive, defines us, reveals our limitations and abilities, and it also combines with poor sleep to stay our courage.

References

American Psychological Association, APA Task Force on Psychological Assessment and Evaluation Guidelines. (2023). *APA Guidelines for Psychological Assessment and Evaluation.* https://www.apa.org/about/policy/guidelines-psychological-assessment-evaluation.pdf

Arntz, A., Lavy, E., Van den Berg, G., & Van Rijsoort, S. (1993). Negative beliefs of spider phobics: A psychometric evaluation of the spider phobia beliefs questionnaire. *Advances in Behaviour Research and Therapy, 15*(4), 257-277. https://doi.org/10.1016/0146-6402(93)90012-Q

Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193-213. https://doi.org/10.1016/0165-1781(89)90047-4

Bowers, C. A., Beidel, D. C., & Marks, M. R. (2022). Obstacles to mental health treatment: Similarities and differences among first responder groups. *Journal of Community Safety and Well-Being, 7*(2), 42-46. https://doi.org/10.35502/jcswb.248

Chockalingam, M., & Norton, P. J. (2018). Facing fear-provoking stimuli: The role of courage and influence of task-importance. *The Journal of Positive Psychology*, *14*(5), 603-613. https://doi.org/10.1080/17439760.1497685

Chowkase, A. A., Parra-Martínez, F. A., Ghahremani, M., Bernstein, Z., Finora, G., & Sternberg, R. J. (2024). Dual-process model of courage. *Frontiers in Psychology*, *15*, 1376195, https://doi.org/10.3389/fpsyg.2024.1376195

Cox, D., Hallam, R., O'Connor, K., & Rachman, S. (1983). An experimental analysis of fearlessness and courage. *British Journal of Psychology*, *74*(1), 107–117. doi:10.1111/j.2044-8295.1983.tb01847.x

Csipo, T., Lipecz A., Owens, C., Mukli, P., Perry, J. W., Tarantini, S., Balasubramanian, P., Nyúl-Tóth, Á., Yabluchanska. V., Sorond, F. A., Mikhail Kellawan, J., Purebl, G., Sonntag, W. E., Csiszar, A., Ungvari, Z., & Yabluchanskiy, A. (2021). Sleep deprivation impairs cognitive performance, alters task-associated cerebral blood flow and decreases cortical neurovascular coupling-related hemodynamic responses. *Scientific Reports*, *11*(1), 20994. https://doi.org/10.1038/s41598-021-00188-8

Eix, A. K. (2021). Calling on courage: The use of a courage intervention to increase engagement in exposure for specific fears. [Doctoral Dissertation, Northwestern University]. Proquest Dissertations & Theses Global. https://cnu.idm.oclc.org/login?url=https://www.proquest.com/dissertations-theses/calling-on-courage-use-intervention-increase/docview/2572572795/se-2?accountid=10100

Gal, D., & Rucker, D. D. (2018). The loss of loss aversion: Will it loom larger than its gain? *Journal of Consumer Psychology*, *28*(3), 497–516. https://doi.org/10.1002/jcpy.1047 j

Gal, D., & Rucker, D. D. (2021). Act boldly: Important life decisions, courage, and the motivated pursuit of risk. *Journal of Personality and Social Psychology*, *120*(6), 1607. https://doi.org/10.1037/pspi0000329

Hawkins, S. F., & Morse, J. (2014). The praxis of courage as a foundation for care. *Journal of Nursing Scholarship*, *46*(4), 263-270. https://doi.org/10.1111/jnu.12077

Howard, M. C., & Alipour, K. K. (2014). Does the courage measure really measure courage? A theoretical and empirical evaluation. *The Journal of Positive Psychology*, *9*(5), 449-459, https://doi.org/10.1080/17439760.2014.910828

Killgore, W. D., Balkan, T. J., & Wesensten, N. J. (2006). Impaired decision making following 49 h of sleep deprivation. *Journal of Sleep Research*, *15*(1), 7-13. https://doi.org/10.1111/j.1365-2869.2006.00487.x

Klorman, R., Weerts, T. C., Hastings, J. E., Melamed, B. G., & Lang, P. J. (1974). Psychometric description of some specific-fear questionnaires. *Behavior Therapy*, *5*(3), 401-409. https://doi.org/10.1016/S0005-7894(74)80008-0

Lei, Y., Wang, L., Chen, P., Li, Y., Han, W., Ge, M., & Yang, Z. (2017). Neural correlates of increased risk-taking propensity in sleep-deprived people along with a changing risk level. *Brain Imaging and Behavior*, *11*(6), 1910-1921. https://doi.org/10.1007/s11682-016-9658-7

LoPresti, M. L., Anderson, J. A., Saboe, K. N., McGurk, D. L., Balkin, T. J., & Sipos, M. L. (2016). The impact of insufficient sleep on combat mission performance. *Military Behavioral Health*, *4*(4), 356-363. https://doi.org/10.1080/21635781.2016.1181585

Lovibond, S. H., & Lovibond, P. F. (1995). Manual for the Depression, Anxiety & Stress Scales. Psychology Foundation. https://doi.org/10.1037/t01004-000

McMillan, T. M., & Rachman, S. J. (1988). Fearlessness and courage in paratroopers undergoing training. *Personality and Individual Differences*, *9*(2), 373–378. doi:10.1016/0191-8869(88)90100-6

Norton, P. J. & Weiss, B. J. (2009). The role of courage on behavioral approach in a fear-eliciting situation: A proof-of-concept pilot study. *Journal of Anxiety Disorders*, *23*(2), 212-217. https://doi.org/10.1016/j.janxdis.2008.07.002

Örsal, O., Örsal, O., Balci Alparslan, G., & Unsal, A. (2012). Evaluation of the relation between quality of sleep and anxiety among university students. *HealthMED*, *6*(7), 2244-225. https://www.researchgate.net/publication/285943226_Evaluation_of_the_relation_between_quality_of_sleep_and_anxiety_among_university_students

Pury, C. L. S., Kowalski, R. M., & Spearman, J. (2007). Distinctions between general and personal courage. *The Journal of Positive Psychology*, *2*(2), 99–114. https://doi.org/10.1080/17439760701237962

Pury, C. L., Starkey, C. B., & Olson, L. R. (2024). Value of goal predicts accolade courage:

More evidence that courage is a taking a worthwhile risk. *The Journal of Positive Psychology*, *19*(2), 236-242. https://doi.org/10.1080/17439760.2023.2178959

Rachman, S. J. (1984). Fear and courage. *Behavior Therapy*, *15*(1), 109–120. https://doi.org/10.1016/s0005-7894(84)80045-3

Rachman, S. J. (2004). Fear and courage: A psychological perspective. *Social Research: An International Quarterly*, *71*(1), 149-176. https://doi.org/10.1353/sor.2004.0060

Rate, C. R. (2010). Defining the features of courage: A search for meaning. In C. L. S. Pury & S. J. Lopez (Eds.), *The psychology of courage: Modern research on an ancient virtue* (pp. 47-66). American Psychological Association. https://doi.org/10.1037/12168-003

Rorty, A. O. (1986). The two faces of courage. *Philosophy*, *61*(236), 151-171. https://doi.org/10.1017/S0031819100021045

Schueller, S. & Parks, A. C. (2014). The Wiley Blackwell Handbook of Positive Psychology Interventions. John Wiley & Sons.

Shelp, E. E. (1984). Courage: A neglected virtue in the patient-physician relationship. *Social*

Science & Medicine, *18*(4), 351-360. https://doi.org/10.1016/0277-9536(84)90125-4

Spielberger, C. D. (1983). Manual for the State-Trait Anxiety Inventory (STAI). Palo Alto, CA: Consulting Psychologists Press

Szymanski, J., & O'Donahue, W. (1995). Fear of spiders questionnaire. *Journal of Behavior*

Therapy and Experimental Psychiatry, *26*(1), 31-34. https://doi.org/10.1016/0005-7916(94)00072-T

Wei, X., Ma, J., Liu, S., Li, S., Shi, S., Guo, X., & Liu, Z (2024). The effects of sleep deprivation on risky decision making. *Psychonomic Bulletin & Review*, https://doi.org/10.3758/s13423-024-02549-6

Wiseman, D. B., & Levin, I. P. (1996). Comparing risky decision making under conditions of real and hypothetical consequences. *Organizational Behavior and Human Decision Processes*, *66(3)*, 241–250. doi:10.1006/obhd.1996.0053

Wolpe, J. (1958). Psychotherapy by reciprocal inhibition. Stanford, CA: Stanford University

Press.

Woodard, C. R., & Pury, C. L. S. (2007). The construct of courage: Categorization and measurement. *Consulting Psychology Journal: Practice and Research*, *59*(2), 135–147. https://doi.org/10.1037/1065-9293.59.2.135