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The Stress Coping Skills of Undergraduate Collegiate Aviators

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THE STRESS COPING SKILLS OF UNDERGRADUATE COLLEGIATE AVIATORS

A Thesis

Submitted to the Faculty

of

Purdue University

by

Jennifer Erin Kirschner

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of

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It gets better.

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ABSTRACT

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An important human factors research interest area is error reduction. Although pilots placed in highly stressful situations have an increased chance of making errors, they use coping skills to lower their stress level and reduce the likelihood of errors. Typically, coping skills are conceptually separated into three different types: active coping skills which attack and change the situation to make it inherently less stressful, emotion-focused coping skills which use discussion or thinking about the situation in a different way to diminish the negative emotional reaction associated with the stressful situation, and avoidant coping skills which allow one to mentally and/or physically disengage through the use of daydreams, sleep, drugs, and/or alcohol. In this research project, a sample of 49 inexperienced private pilots and 30 experienced multi-engine commercial pilots were surveyed to determine if significant differences existed between their levels of perceived stress and the frequency with which they used different types of coping skills using a one-time, written survey. Variables measured included demographic information, factors of personality, frequency of binge drinking, perceived level of stress, and coping skills usage. The results showed that there was an association between experience level and stress ($F = 5.46$, $p = .022$), emotional coping, ($r = .200$, $p = .078$) and instrumental

coping (r = .201, p = .075). There was also an association between stress and self-blame

(r = .273, p = .015), humor (r = -.214, p = .059), positive reframing (r = -.204, p = .071),

and the frequency of binge drinking (-.200, p = .078).

CHAPTER 1. INTRODUCTION

1.1. <u>Background</u>

Flying is an inherently stressful activity. Learning a new skill set in the unfamiliar, noisy flight environment while under pressure to perform within strict tolerances has the potential to increase a student's stress level drastically. High stress levels, however, can decrease the ability to perform an activity correctly. Under high levels of stress, some students become overwhelmed and struggle to cope while others are able to perform well. Students unable to cope in an aviation education environment might decide they are in the wrong program and change majors, while students who can better manage their stress level might continue. This raises several questions: how do aviation students cope with stress? What factors make one student able to perform well under high levels of stress, while others cannot? Do the coping skills that aviation students use change during the course of their flight training?

While high levels of stress have been shown to negatively impact performance (Katz, 1997; Matthews, 2001; Salas, Driskell, & Hughes, 1996), documenting the relationship can be difficult. Anonymity must be guaranteed to ensure that the results will not affect a participant's future employment. Additionally, questions must be phrased in a non-judgmental, non-punitive manner so participants do not experience a perceived loss of social status from admitting to experiencing the negative effects of

stress (Matthews, 2001; Young, 2008). However, research involving coping skills is usually less stigmatized (Matthews, 2001). The current research project mixed both types of research by investigating the perceived stress levels and coping skills used by inexperienced and experienced aviation students.

1.2. Statement of Purpose

The purpose of this research was to examine the stress levels experienced by collegiate aviation students and the coping skills they use to deal with their stress. Specifically, the study investigated whether inexperienced and experienced aviation students differed in the perceived stress levels they experience, if inexperienced and experienced students differed in the coping skills they use to deal with stress, and if different levels of perceived stress correlated with increased usage of certain types of coping skills. Stress levels and coping skills of inexperienced aviation students and experienced aviation students were compared using a cross-sectional, correlational research design in order to better understand the mechanisms they use to deal with their stress level.

1.3. Research Questions

This thesis will answer four questions:

- Do inexperienced and experienced aviation students encounter different levels of perceived stress?

- Do inexperienced and experienced aviation students use different coping skills in order to handle stress?

- Do increased levels of perceived stress correlate with increased usage of different types of coping skills?

- Does level of perceived stress correlate with frequency of binge drinking?

1.4. Assumptions

The following assumptions were made in this study:

- Participants are representative of the entire population of Purdue aviation students.

- Participants were able to accurately describe and rate their use of certain coping skills.

- Participants responded to the survey accurately.

- The number of participants surveyed was adequate to detect differences in coping skills use.

1.5. Limitations

The following limitations may lower the generalizability of the results:

- Participants were limited to volunteers from the collegiate aviation student population of Purdue University during the spring semester of the 2010 to 2011 academic year.

- Only students enrolled in two required flight courses were requested to participate in the research project; the students enrolled in these courses might differ in some way from students not enrolled in these courses.

- In order to measure coping skills, this study will utilize the COPE assessment, using a between-person, correlational study. No other assessment of coping skills usage will be considered.

- This study was limited by the ability of participants to recall coping skills used previously.

1.6. Delimitations

In the interest of feasibility, there are many issues that this study did not seek to address:

- The study did not focus on any pilot groups outside of Purdue University during the spring semester of the 2010 to 2011 academic year.

- Participants were limited to two specific categories (private pilots and multi-engine commercial pilots) in order to maintain adequate separation between the experience levels of the groups.

- This study did not attempt to quantify the different types of stressors that collegiate aviation students encounter while transitioning to college and learning how to fly.

CHAPTER 2. REVIEW OF RELEVANT LITERATURE

This literature review will summarize current stress and coping skills research, including different factors affecting the choice of coping skills. A review of aviation specific coping skills research is provided, as well as literature from various areas of psychology.

2.1. Overview of Stress

Stress can be defined as "any environmental, social, or internal demand which requires the individual to readjust his/her usual behavior patterns" (Thoits, 1995, p. 54). Expectations, demands, and commitments are all examples of stressors (Martinussen & Hunter, 2010). Stress is dynamic. That is, stress levels can change from day to day or moment to moment (Lazarus, 1991; Thoits, 1995), and can function as an internal state, an external event, or an internal/external interaction (Aldwin, 2007; Young, 2008). Internal states refer to physiological or emotional conditions such as sweaty palms or anxiety. External events could be traumatic situations like combat or chronic states like work stress. Internal/external interactions create stress when there is a disparity between one's resources and situational demands. As soon as the situation requires more resources than are available, stress occurs. The point at which requirements surpass ability, however, is different for each individual (Martinussen & Hunter, 2010).

Flying is an inherently stressful activity (Matthews, 2001; Martinussen & Hunter, 2010; Tefler & Biggs, 1988; Thomas, 1989). Some causes of pilot stress are long flights, fatigue, periodic flight check rides, communication/interpersonal issues, and family problems (Butcher, 2002; Matthews, 2001). Pilots are responsible for safely operating complex machinery and for staying vigilant to detect minor changes that could signal a multitude of emergencies (Larkins, 2010). While some amount of stress may increase performance and help pilots stay focused, an excessive amount of stress is associated with a reduction in performance (Katz, 1997; Matthews, 2001; Salas, Driskell, & Hughes, 1996), an increase in errors committed (Martinussen & Hunter, 2010), and an increase in accident rates (Loewenthal, et al., 2000; Young, 2008).

So how much stress is too much and, more importantly, how do we reduce the effects of stress on pilots? The answer to that is complicated. Stress is generally accepted as being constantly present in our daily life, but the effect it has on individuals and the ways they choose to cope with stress can differ widely.

Psychological stress and its damaging effects are quite an individual matter. Without knowing what is involved personally for individuals and particular collectivities, and the particular contexts in which they operate, we will be handicapped in our understanding and in our efforts to ameliorate or prevent stress in the workplace (Lazarus, 1991, p. 5).

2.2. <u>Overview of Coping</u>

In order to reduce stress, individuals utilize coping skills. Most research on coping skills is grounded in theories developed by Richard Lazarus in the 1960s (Folkman & Moskowitz, 2004; Carver, Weintraub, & Scheier, 1989). Lazarus (1991) defined coping skills as "the cognitive and behavioral efforts a person makes to manage demands that tax or exceed his or her personal resources" (p. 6). The ability to cope with stress can be conceptualized as either a static, unchanging quality or as a skill set that can be learned, but there is a growing trend to view it as the latter (Lazarus, 1991). Most importantly, this viewpoint highlights the fact that individuals are active participants in the stress process, not just passive spectators (Band & Manuele, 1987). When there is a conflict between our needs and our environment, we have the ability to change our environment to better suit our needs, which would seem to have evolutionary advantages. Secondly, this also implies that more adaptive coping skills can be learned. If one coping strategy is not producing the desired result, another strategy better suited for that situation might be used instead (Aldwin, 2007; Folkman & Moskowitz, 2004).

2.2.1. Types of Coping Skills

Although multiple schemas for categorization exist, research generally separates coping strategies into three distinct, theoretically derived categories: active (or problem-focused), emotion-focused, and avoidant (Carver, et al., 1989; Folkman & Moskowitz, 2004; Lazarus, 1991; Thoits, 1995; Tennen, Affleck, Armeli, & Carney, 2000). Active coping strategies are most adaptive when the problem can be solved. They directly attack

the source of the stress and attempt to change the situation for the better. Emotional-focused coping, on the other hand, is more effective when the situation cannot be changed and involves articulating feelings about the situation through prayer, venting, or seeking support from friends or family members (Carver, et al., 1989; Cartwright & Cooper, 2005; Folkman & Moskowitz, 2004). Avoidant strategies include denying that the stressor exists, mentally disengaging using daydreaming or sleeping, and increased alcohol/drug use in order to numb the stressful feelings (Folkman & Moskowitz, 2004; Park, Armeli, & Tennen, 2004). The specific facets of coping that fall under each category, however, depend on the population studied and the context under which they are referred to (Carver, 1997); for example, seeking instrumental support – asking others for help and advice – can either be considered as an emotional-focused coping skill because it seeks outside support or as an active coping skill because it involves working to change the problem.

2.2.2. Factors Affecting the Choice of Coping Strategies

While certain coping skills have been conceptualized as being more adaptive in certain situations, elements other than the type of situation can affect an individual's choice of coping skills. Some individual characteristics that can affect the choice of coping skills include personality, gender, and cultural background.

2.2.2.1. <u>Personality</u>

Personality can help determine typical behavior in a given situation (Christiansen & Tett, 2008). While personality is a relatively stable construct, the use of specific types of coping skills can change over time, especially through training. However, measuring coping skills can provide incremental validity over and above personality in predicting the actions an individual will take in future stressful situations (Carver & Connor-Smith, 2009). Personality can be separated into five distinct facets, also known as the Big Five – extroversion, agreeableness, conscientiousness, neuroticism, and openness to experience (McCrae & John, 1992) – and have been shown to be modestly related to the type of coping skill chosen in a given situation (Carver, et al., 1989; Dillinger, Weigmann, & Taneja, 2003). High levels of extroversion can be characterized by talkativeness, enthusiasm, and energy (McCrae & John, 1992); extraverts have been shown to use higher levels of emotion-focused coping skills (Carver & Connor-Smith, 2009; Dillinger, et al., 2003). An individual who rates high on conscientiousness could be described as being efficient, organized, and resourceful (McCrae & John, 1992). Increases in conscientiousness can increase active coping skills (Carver & Connor-Smith, 2009; Dillinger, et al., 2003). High levels of neuroticism can be characterized by anxiety, instability, and constant worry (McCrae & John, 1992); increases in neuroticism have been correlated with increases in the use of avoidant coping skills (Carver & Connor-Smith, 2009; Dillinger, et al., 2003). Studying the Big 5 can help to explain typical behavior in a given situation, including the coping skills used in stressful situations.

2.2.2.2. <u>Gender</u>

Gender is also thought to have an effect on the relationship between stress and the type of coping skill chosen, though results are not always consistent (Thoits, 1995). Men often respond to stressful situations by choosing either active coping strategies or avoidant strategies such as alcohol or drug use (Aldwin, 2007; Desmarais & Alksnis, 2005; Dyson & Renk, 2006; Tennen, et al., 2000), while women often choose emotional-focused coping strategies such as seeking support or positive re-framing (Desmarais & Alksnis, 2005; Dyson & Renk, 2006).

2.2.2.3. <u>Cultural Background</u>

Cultural background can affect an individual's preferred coping strategies (Lui & Spector, 2005; Aldwin, 2007). Hofstede (2001) used four dimensions – individualism/collectivism (I/C), power distance (PD), masculinity/femininity (MF), and uncertainty avoidance (UAI) – to rate how individuals from different cultures interact with each other and with their environment. I/C describes the extent to which individuals are committed either to achieving their own goals or to accomplishing the goals of the group. An individual from a collectivist culture might be more interested in the good of the group than his or her own good, while someone from an individualistic culture could be more self-centered. PD measures the perceived distance between "high" and "low" power individuals. If a "low" power subordinate would feel comfortable questioning and criticizing a "high" power superior, the surrounding culture might be characterized as having a low PD because there would be little distance between individuals, regardless of their places in the formal hierarchical structure. In a culture with a high PD, however, a

greater distance would exist between "high" and "low" individuals, which would be expressed as an acceptance of authority and a reluctance to question the decisions of a superior. MF is usually defined as a cultural preference for values traditionally seen by Western countries as either masculine (such as competition or success) or feminine (such as relationships or well-being). Cultures can be rated as predominantly masculine, feminine, or neutral. UAI is a measure of how comfortable individuals typically are with the unknown, expressed in terms of how structured their cultural rules or guidelines are. Individuals in cultures with a high UAI prefer formal rules about religion, food, or other rituals, while cultures with a low UAI have less structure associated with their rituals.

Western cultures typically are high in individualism, have a low PD, have masculine values, and have a low UAI. Individuals raised in such cultures tend to prefer more active coping strategies because there are comparatively fewer risks associated with actively challenging and changing their environments. In contrast, individuals raised in eastern cultures that are high in collectivism, have a high PD, have feminine values, and have a high UAI might prefer more emotion-focused coping skills because the risk of retaliation for challenging others is much higher (Lui & Spector, 2005).

2.2.2.4. Other Factors

Social status, perceived control over life events, and self-esteem have been shown to affect stress levels and increase the use of maladaptive coping skills, but findings have been mixed (Thoits, 1995). These variables were outside the scope of the current study and were not measured.

2.2.3. Measurement of Coping Skills Usage

Inventories of coping strategies, such as the Ways of Coping and the COPE inventory, are the most common ways to measure coping ability (Folkman & Moskowitz, 2004; Parker, Endler, & Bagby, 1993). Research participants are asked to use a 5-point Likert scale to rate the extent to which they used the listed coping skills either during their last stress-producing event or during the past month or year. Inventories measure how often specific facets of coping skills are utilized. Some advantages of using inventories include ease of administering and generalizability to large populations. Disadvantages include their potentially long length, an inability to recall events accurately, and the possibility that participants rate items based on the extent to which the coping skill reduced stress instead of based on the frequency of use (Carver, et al., 1989). In order to adequately encompass the range of coping skills possible and ensure high levels of reliability, longer length tests are sometimes used, which can decrease the accuracy of the test as study participants lose interest in completing it.

In order to reduce the inaccuracies created by using inventories, coping skills have also been measured using a daily process approach (Tennen, et al., 2000), which conceptualizes coping skills using a within-person approach instead of a between-person approach. That is, instead of measuring the coping skills of large groups of people once and looking for commonalities between them, it assesses mood and coping skills on a day-to-day basis to track changes within-person. Although the daily process approach has shown much promise in furthering theory, collecting and then analyzing such a large amount of data was beyond the scope of this research project.

The Ways of Coping scale is the most widely used coping skills inventory but was created empirically, using examples of coping skills thought to describe the range of common coping skills (Parker, Endler, & Bagby, 1993); thus, the dimensions of the test do not clearly map onto any of the factors of coping. While this is adequate to tap into the domain of knowledge associated with the construct of coping, it does not aid in theory development. The COPE test, on the other hand, was developed using existing theories about specific facets of coping skills in order to not only describe the construct of coping, but also stimulate further theory development (Carver, Scheier, & Weintraub, 1989). Because of item redundancy and the overall length of the original 53 question COPE test, a 28 item shortened version was used for the current study (Carver, 1997). This 28 item version measures 14 different facets of coping, including self-distraction, active coping, denial, substance abuse, emotional support, behavioral disengagement, venting, instrumental support, positive reframing, blame, planning, humor, and religion.

Self-distraction measures how often respondents cope with stress by finding other activities in order to "take their mind off" their stressors. The *active coping* facet asks if participants focus on "doing something about the situation" (Carver, 1997, p. 97). *Denial* relates to refusing to believe how stressful the situation really is. The *substance abuse* facet asks about drug and alcohol use. *Emotional support* involves turning to friends or family for comfort and support. *Behavioral disengagement* measures propensity to stop trying and just give up when stressed. *Venting* involves talking out negative feelings. *Instrumental support*, on the other hand, asks if respondents ask for advice and help from others. *Positive reframing* relates to finding something positive about situation. *Self-blame* measures if participants criticize themselves for stressful situations. *Planning* asks

about strategizing and prioritizing to make sure tasks get done. *Humor* involves joking about the situation. *Acceptance* asks if participants take responsibility for their actions. *Religion* relates to finding comfort in religion and/or praying (Lyne & Roger, 2000).

2.3. Current Research in Stress Coping Skills in Other Populations

Stress coping skills have been studied in several other fields that can be compared to aviation. College students in general tend to have higher than normal levels of stress (Park, et al., 2003). Due to similar working conditions and stress levels, the medical field has been compared to aviation repeatedly (Helmreich, 2000), as has law enforcement (Malone, 2008).

2.3.1. College Student Populations

The effects of stress on college students in general has been well-documented. This is especially true for students during the first year experience, a period of acclimation to the college environment (Dyson & Renk, 2006). An increased stress level has been positively correlated with depression and the use of avoidant coping strategies in college students (Park, et al., 2003); many students meet the criteria for alcohol dependence or abuse (Knight, et al., 2002). Daily variations in stress level have also been strongly correlated with the daily usage of alcohol by college students (Park, et al., 2003). First year students are shown to have higher levels of perceived stress and higher stress reactions than upperclassmen (Misra & McKean, 2000), but stress management training that included training in coping skills has been shown to help decrease levels of anxiety

and anger (Iglesias, et al., 2005). Stress level is thought to relate to alcohol abuse in a transactional model where stress creates feelings of "distress," or anxiety (Grzywacz & Almediam, 2008). Individuals then self-medicate to soothe this feeling.

Currently, alcohol is the third leading cause of preventable death in the U.S., ending 85,000 lives a year (Courtney & Polich, 2009). Alcohol abuse is rampant in college settings; a study of 14,000 students at 119 universities across the country found that almost 40% of students met at least one criteria for alcohol abuse or dependence (Knight, et al., 2002). One form of alcohol abuse is binge drinking. Binge drinking consists of consuming five or more (four or more in females) alcoholic drinks in a single occasion, and has been associated with "subsequent negative health, social, economic, or legal consequences" (Courtney & Polich, 2009, p. 143). Incidents of traffic accidents, violent behavior, and suicide also increase as the frequency of binge drinking increases (Stolle, M., Sack, P.-M., & Thomasius, R., 2009). While alcohol abuse has many negative effects, some students still drink excessively. A survey involving 10,000 first year students at 14 colleges and universities discovered that, among those males who met the criteria for binge drinking, half drank at least twice that level (White, A. M., Kraus, C. L., & Swartzwelder, H. S, 2006), putting themselves and those around them in danger.

2.3.2. Medicine

The medical field is commonly compared to aviation because of the parallels that can be drawn between the two, including their shared emphasis on teamwork, the potential for life-threatening errors, and the amount of initial and recurrent training

necessary. Pilots, surgeons, and nurses have shown roughly equivalent attitudes towards the effects of stress on their job performance and their decision-making abilities in emergency situations (Sexton, Thomas, & Helmreich, 2000). In a study of Australian mental health nurses, years of experience were shown to correlate positively with the ability to deal with stress; however, specific coping skills were not measured (Humpel & Caputi, 2001). First-year nursing students who reported lower levels of stress also reported using more active coping skills, while nurses reporting higher levels of stress reported using emotional or avoidant coping skills (Jones & Johnson, 1997). However, training has been shown to improve nurses' ability to cope with stress. Nurses given a 90-minute coping skills course, taught once-a-week for six weeks, showed significantly lower levels of burnout and anxiety and a significant increase in the usage of active coping skills (Rowe, 2002). When employees were given training on proactive methods to combat work-related stress, they were able to deal more effectively with their stress level and suffered fewer negative effects. After a year, the usage of active coping skills decreased to the level of the control group, but adding a refresher course once every six months for a year and a half increased the effective interval to two and a half years.

2.3.3. Law Enforcement

Stress coping skills have also been examined in law enforcement, another stress-prone industry. A study of Australian police officers found that more experienced officers used different types of coping skills than less experienced officers, but both had similar stress levels (Anshel, Robertson, & Caputi, 1997). Although it did not reach a significant level, a study of British police officers also found that experienced officers

used more active coping skills and less emotion-focused and avoidant coping skills than inexperienced police officers (Ortega, Brenner, & Leather, 2007).

2.4. Current Stress Coping Skills Research in Aviation

Documenting the effects of stress in pilots can be difficult because of a lack of pilot awareness about the negative impact stress can have on performance or the threat of consequences for admitting to poor performance due to stress, such as denial of employment or removal from flight status (Butcher, 2002; Matthews, 2001; Young, 2008). However, stress is common among pilots (Matthews, 2001; Larkins, 2010). The executive chairman of the Air Line Pilot Association's Human Performance Structure was recently quoted as saying,

> Our representatives have seen an uptick across the board in stress-related issues, manifested in medical or professional standards issues and in general malaise… no other industry in the United States has been under more direct stress and pressure since 9.11, and we know that our members are carrying that stress (Burke, 2007, p. 24).

Almost half of a sample of over 400 British airline pilots surveyed reported that they had difficulty concentrating "at least sometimes" because of stress (Sloan & Cooper, 1986). In a similar study using 60 American fighter pilots, 89% reported experiencing insomnia and 86% reported being irritable due to stress. Over half also reported dissatisfaction, fatigue, self-accusation, and work difficulty. No significant differences were found between pilots stationed overseas during combat operations and those

stationed in the States (Parsa & Kapadia, 1997). A Japanese study examining the stress reactions of military student pilots and flight instructors showed that, while both groups showed significantly higher physiological indicators of high stress after flying, instructors had drastically lower levels (Otsuka, Onozawa, & Miyamoto, 2006). Another study found that pilots' ability to control their situation limited their ability to successfully cope with stress (Katz, 1997); situations over which they perceived themselves as having little or no control were rated as much more stressful. An increased use of avoidant coping skills such as potentially disruptive behavior or drug/alcohol use was also shown to be correlated with an increase in at-fault aircraft mishaps in naval aviators (Alkov, Gaynor, & Borowsky, 1985).

The stress coping skills used by collegiate student pilots have been found to correlate with personality, although student pilots were found to use less active coping skills and more support coping skills than the general population (Dillinger, et al., 2003). In a study of 105 British and Israeli airline pilots, pilots who had experienced stressful life events were more likely to be involved in an air traffic incident over the next 12 months (Loewenthal, et al., 2000), which highlights the importance of reducing stress and developing effective coping skills in order to maximize aviation safety.

2.5. Hypotheses

Based on established theory and the preceding literature review, it is hypothesized that inexperienced and experienced students will have different levels of perceived stress and will use different types of coping skills to deal with stress. It is further hypothesized

that students with lower levels of perceived stress will utilize different types of coping skills than students with higher levels of perceived stress, and students' level of perceived stress will correlate with their level of binge drinking.

CHAPTER 3. FRAMEWORK AND METHODOLOGY

The objective of this chapter is to lay the groundwork for the methodology of this study by discussing the nature of the current research. In order to answer the question, "do inexperienced aviation students and experienced aviation students differ in the stress coping skills they use to reduce their stress level?" a cross-sectional, correlational research study was used.

3.1. <u>Participants</u>

A total of 84 students agreed to participate in the survey and were separated into two groups. The first group contained 49 participants (46 men, three women, $M_{age} = 19$ years, $M_{time} = 85.2$ hours of flight time) who had or were working towards a private pilot's license. This group was classified as inexperienced. Additionally, there were 30 (28 men, two women, $M_{age} = 22$ years, $M_{time} = 339$ hours of flight time) pilots that met the requirements for a commercial, multi-engine license. They were classified as experienced. One non-aviation major was removed from the dataset, as were two first-year flight students who had not yet started flight training and two first year students working toward commercial licenses, because they did not fit into either classification. Refer to Table 3.1 for more demographic information.

.

Table 3.1
Demographic Information

	Age *M(SD)*	Flight Hours *M(SD)*	Gender	Nationality
Inexperienced (*n* = 49)	18.65 (0.59)	85.2 (47.4)	men: 46 women: 3	American: 44 non-American: 5
Experienced (*n* = 30)	21.93 (0.87)	338.6 (103.5)	men: 28 women: 2	American: 30 non-American: 0

3.2. Variables and Instruments

Please refer to the Appendix for the survey instrument used in this study. The variables collected included the following:

1. Demographic information including age, year in college, major, gender, nationality, number of flight hours, and flight ratings held.

2. Personality, as measured by a 10-item Big Five personality measure (Rammstedt & John, 2007).

3. Level of binge drinking, as measured by the Fast Alcohol Screening Test and re-scaled to reflect typical collegiate levels of alcohol abuse (Hodgson, Alwyn, John, Thom, & Smith, 2002; Kanny, Lui, & Brewer, 2011).

4. Amount of stress, as measured by the Perceived Stress Scale, the most widely used measure of stress level (Cohen, Kamarck, & Mermelstein, 1983).

5. Stress coping skills, as measured by a shortened COPE test with the addition of an open-ended question requesting information about coping skills not included in the survey (Carver, 1997).

3.3. Pilot Testing

The survey was pilot tested in a graduate research seminar. Five Aviation Technology graduate students completed the survey and offered comments. Based on their recommendations, the initial survey was changed to use the Brief COPE measure of coping instead of the entire COPE in order to shorten the length of the survey. Next, a full-time flight instructor completed the survey and suggested changing the wording of several questions in order to make them easier to understand. Finally, two student pilots not involved in the final study completed the survey and recommended that the instructions be changed to make them more applicable to flight students.

3.4. Data Collection

Survey data was collected after the research proposal was approved by the Institutional Review Board (IRB). A faculty member from a first-year required flight course and a faculty member from a junior/senior level required flight course were contacted in order to obtain student participation. These courses were chosen in order to sample inexperienced aviation students with only a private pilot's license and experienced aviation students with commercial pilot license and instrument rating who were completing or had completed a multi-engine license. While every first-year student was required to take the first-year course, only half of the seniors were required to take the senior level flight course offered during the Spring semester of 2011. This limited the generalizability of the study because the seniors enrolled in the course might have differed in some meaningful way from seniors not enrolled in the course. After the course instructor stated that class had ended and left the room, the researcher introduced

the survey, explained that participating would not affect grades in that or any other class, and asked students over age 18 to voluntarily complete a short survey. A paper copy of the survey was then distributed to students interested in participating. There was no compensation for completing this study.

CHAPTER 4. RESULTS AND DISCUSSION

4.1. <u>Data Analysis</u>

This chapter describes the method used to analyze the collected survey data. Data analysis was done using the Statistical Package for the Social Sciences (SPSS). Survey data collected was entered into a spreadsheet and analyzed to determine if significant relationships existed between the variables.

4.2. <u>Hypothesis 1</u>

$H1_o$: There will be no statistically significant difference in the mean level of stress experienced by collegiate aviation students with different levels of flight experience.

$H1_\alpha$: There will be a statistically significant difference in the mean level of stress experienced by collegiate aviation students with different levels of flight experience.

Perceived level of stress was measured by a 10 item Perceived Stress Scale (PSS) using a five-point Likert scale, ranging from zero (never experiencing stress) to four (experiencing stress very often). As suggested by Cohen, Kamarck, & Mermelstein (1983), responses to all items were summed to create a measure of total stress, on a zero to 40 scale. Cronbach's alpha for all 10 items was .839, suggesting high internal consistency. The mean level of stress for the experienced and inexperienced groups were

12.97 (SD = 5.04) and 15.90 (SD = 5.6), respectively. Normative data from the creation

of the PSS shows that for a group of 648 18-29 year olds the average stress level was

14.2 (SD = 6.2) (Cohen, Kamarck, & Mermelstein, 1983). Comparatively, a recent study

of 170 Caucasian undergraduate students in a large mid-Atlantic university found that the

average stress level was 18.81 (SD = 6.84) (Pieterse, Carter, Evans, & Walter, 2010).

In order to test this hypothesis, a one-way ANOVA was performed. The null

hypothesis of no difference between the groups was rejected at the alpha = .05 level (F =

5.46, p = .022); therefore, hypothesis 1 was confirmed. The box plot in Figure 4.1 helps

to further illustrate the difference between stress levels in experienced and inexperienced

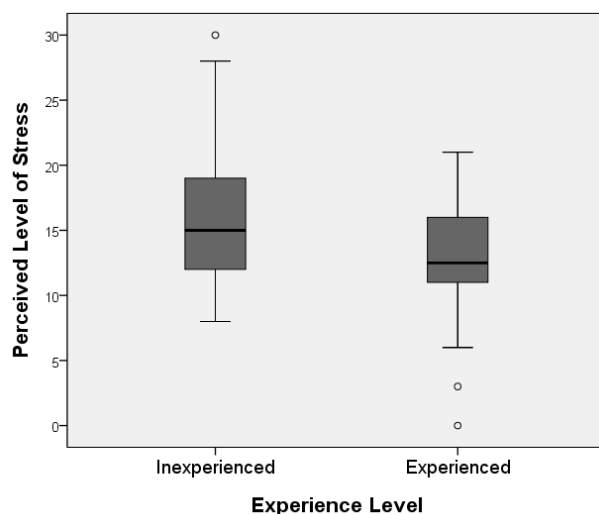pilots; the experienced pilots reported experiencing lower levels of stress.

Figure 4.1 Box Plot of Perceived Level of Stress; range = 0 to 40

In the box plot, the mean response is shown by a thick dark line. The upper and

lower quartiles (representing the highest 25% and lowest 25% of the values) are marked

by the top and bottom of the box, while the sample maximum and minimum values are

shown by the whiskers, with outliers' marked as circles. The box plot makes it easy to visualize the difference in stress level between experienced and inexperienced students.

The level of perceived stress could have decreased in the experienced group for several reasons. The first year at college is a particularly stressful time for students, as they undergo many changes; anxiety, depression, and high attrition rates are common (Rayle & Chung, 2007). The decrease in stress for the experienced group could be due to students with higher-stress levels self-selecting out of the aviation program after their first year. Another possible explanation could be that increased exposure to the stressors found in flight training and in college decreases sensitivity to them, which in turn lowers stress level over the course of a college career. The continued exposure to stressful situations such as flight training may increase confidence in one's ability to handle those stressors. An increase in experience might also increase one's perceived control over stressful events. A high "internal locus of control" indicates a belief that events occur due to personal influence, instead of external factors. Individuals with a higher internal locus of control have been shown to have lower stress levels due to their higher perceived control over stressful events (Parkes, 1991).

4.3. Hypothesis 2

$H2_o$: There will be no statistically significant correlation between the level of flight experience and the coping skills used by collegiate aviation students.

$H2_\alpha$: There will be a statistically significant correlation between the level of flight experience and the coping skills used by collegiate aviation students.

Coping skills were measured by a 28-item previously published COPE inventory that used a four point Likert scale to indicate how often participants used 14 different facets of coping skills. Responses ranged from 1 (I don't usually do this) to 4 (I do this a lot). Two questions assessed each facet, and were summed to create a 2 to 8 scale for each facet. Four facets (measures of self-distraction, active coping, behavioral disengagement, and venting) had a Cronbach's alpha of less than .5 and were removed from the analysis. A Spearman correlation matrix was then constructed on the remaining 10 facets to test the hypothesis that there would be a significant relationship between group membership (experienced vs. inexperienced) and the use of coping skills. See Table 4.1 for the matrix. Emotional support and instrumental support, two facets of emotion-focused coping, were significant at the alpha = .10 level (r = .200, p = .078 and r = .201, p = .075, respectively). See Figures 4.2 and 4.3, respectively, for histograms comparing the responses of experienced and inexperienced pilots. The histograms help highlight the difference in responses between experienced and inexperienced students. On both scales, experienced students were more likely to use emotional-focused coping skills "sometimes" or "a lot," while inexperienced students were more likely to select either "I don't do this" or "I do this a lot."

Emotional coping measures the proclivity of individuals to turn to friends or family for "comfort and understanding." Instrumental support is related, and involves "getting help and advice from other people." Experienced students indicated more use of emotional and instrumental coping skills than did less experienced students. This could be due to an increased focus on crew operations during line-oriented flight training (LOFT) scenarios encountered in larger aircraft during the junior and senior years at

Purdue. Classes in crew resource management (CRM) and human factors expose students to the benefits of operating in a crew situation and incorporating others in their decision-making process.
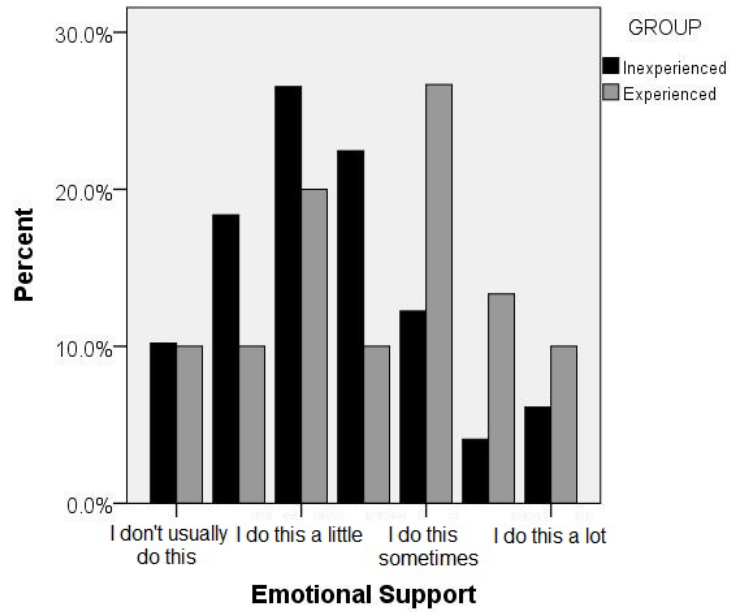

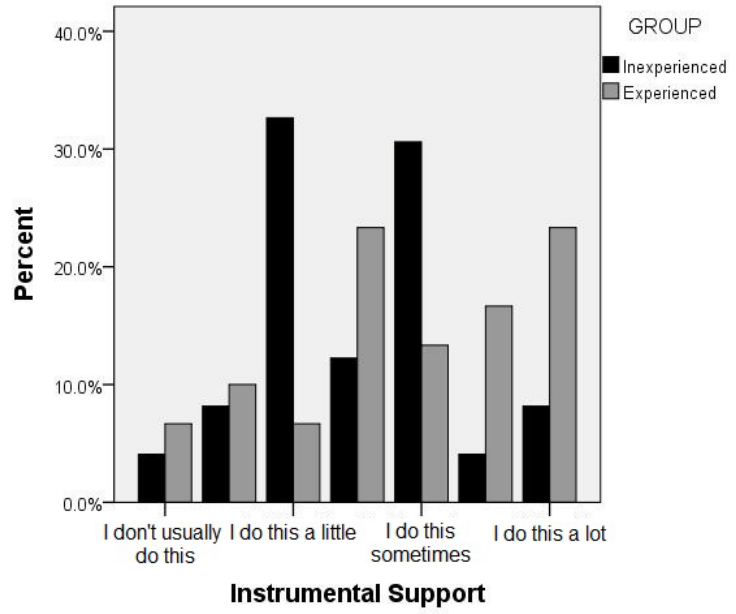*Figure 4.2* Histogram of the Use of Emotional Support as a Coping Skill

Figure 4.3 Histogram of the Use of Instrumental Support as a Coping Skill

Table 4.1

Correlation Matrix for Level of Flight Experience, Perceived Stress, and Binge Drinking with Coping Skills

		Denial	Sub. Abuse	Emotional Support	Instrum. Support	Positive Reframe	Self-blame	Plan	Humor	Accept	Religion
Flight Exper.	Corr. Coef.	-.117	.108	.200*	.201*	.094	-.006	-.106	-.906	.009	-.046
	Sig. Level	.303	.345	.078	.075	.411	.959	.353	.402	.938	.685
	N	79	79	79	79	79	79	79	79	79	79
Perceived Stress	Corr. Coef.	.066	.015	.080	-.092	-.204*	.273**	-.167	-.214*	-.084	.162
	Sig. Level	.562	.897	.482	.422	.071	.015	.142	.059	.460	.154
	N	79	79	79	79	79	79	79	79	79	79
Binge Drink	Corr. Coef.	.033	.499***	-.062	-.049	.034	.081	.109	.168	.240**	-.397***
	Sig. Level	.606	.000	.588	.665	.769	.476	.339	.138	.033	.000
	N	79	79	79	79	79	79	79	79	79	79

*** Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).
* Correlation is significant at the 0.10 level (2-tailed).

4.4. <u>Hypothesis 3</u>

$H3_o$: There will be no statistically significant correlation between the level of perceived stress and the coping skills used by collegiate aviation students.

$H3_\alpha$: There will be a statistically significant correlation between the level of perceived stress and the coping skills used by collegiate aviation students.

See Table 4.1 for correlations between perceived stress level and coping skills. Significant relationships were found between perceived level of stress and self-blame ($r = .273$, $p = .015$), humor ($r = -.214$, $p = .059$), and positive reframing ($r = -.204$, $p = .071$). Therefore, the null hypothesis of no relationship between the variables was rejected, and hypothesis 3 was supported.

Self-blame measures an individual's propensity to blame themselves for things that have happened, regardless of their ability to control events. Humor and positive re-framing are related coping facets. Humor involves joking about or making fun of the situation in order to make it seem less stressful, while positive re-framing asks if individuals look for something good about the situation or try to see it in a better light. All three may be considered facets of emotional-focused coping, as they involve one's emotional reaction to a stressful situation. Students with lower levels of stress used less self-blame, more humor, and more positive re-framing in order to cope with their stress levels. In other words, the use of more adaptive emotional-focused coping skills was associated with a decrease in stress. This could be due to students self-selecting out of the flight program, or learning better coping skills over time.

Interestingly, although it was not hypothesized, statistically significant relationships were found between the level of perceived stress and the Big 5 personality factors of neuroticism (r = .459, p = .000) and agreeableness (r = −.344, p = .002).

4.5. Hypothesis 4

H4$_o$: There will be no statistically significant correlation between the level of perceived stress and the level of binge drinking reported by collegiate aviation students.

H4$_\alpha$: There will be a statistically significant correlation between the level of perceived stress and the level of binge drinking reported by collegiate aviation students.

Level of binge drinking correlated with the level of perceived stress (r = −.200, p = .078). Although a direction was not formally hypothesized, an increase in the level of perceived stress was unexpectedly associated with a decrease in the frequency of binge drinking. Analyzing solely the over-age-21 population found in the experienced group yielded approximately the same correlation (r = −.327, p = .078). Therefore, the null hypothesis of no relationship between the variables was rejected, and hypothesis 4 was supported.

As levels of perceived stress increased in participants, the frequency of binge drinking decreased. Stress level is generally theorized to be related to alcohol use in a transactional model where increased stress results in "distress," or unpleasant feelings (Grzywacz & Almediam, 2008). Individuals then self-medicate through some form of substance abuse, such as binge drinking, to decrease their distress. However, findings have been mixed; the type of stress has been shown to affect the relationship between

stress level and frequency of binge drinking, as has socioeconomic status (Grzywacz & Almediam, 2008). Binge drinking can be separated into two distinct types: social drinking (drinking to reinforce positive relationships) and escape drinking (drinking as a means of mental/behavioral disengagement). Lower stress levels have been correlated with higher levels of social drinking, while higher stress levels have been correlated with increased levels of escape drinking (Williams & Clark, 1998). This research asked participants about their drinking habits in general, but did not specify the circumstances for drinking. One avenue for further research would be to investigate the specific circumstances under which drinking occurs to discover why participants felt driven to consume alcohol.

Correlations between the frequency of binge drinking and individual facets of coping are listed in Table 4.1. Although not hypothesized, statistically significant correlations were found between binge drinking and substance abuse ($r = .499$, $p = .000$), acceptance ($r = .240$, $p = .033$), and religion ($r = -.397$, $p = .000$).

CHAPTER 5. CONCLUSIONS AND IMPLICATIONS

The purpose of this study was to examine the perceived stress levels experienced by collegiate aviation students and their coping skills usage. The objectives were to discover if experienced and inexperienced students differed in their levels of perceived stress and in the coping skills they use to deal with their stress level. Additionally, relationships between perceived stress level, binge drinking and coping skills were studied.

5.1. Conclusions

Three main conclusions are suggested by this research: (1) level of perceived stress decreases with an increase in flight experience, (2) use of specific types of emotional-focused coping skills increase with an increase in flight experience, and (3) students with lower stress levels were more likely to use more emotional-focused coping skills, yet report more frequent binge drinking.

More experienced students reported lower levels of perceived stress. This could be due to students unable to cope with the high level of stress self-selecting out of flight training instead of continuing. Additionally, more experienced students might have a higher tolerance for stress due to increased exposure to it, or a higher locus of control.

More experienced students also used more emotional support and instrumental support, both facets of emotional-focused coping skills. This might be due to an increased focus on crew situations during the final two years of the Purdue flight program. Finally, there was an association between the level of perceived stress and several types of emotional-coping skills. Lower levels of stress were correlated with less use of self-blame, more use of humor, and more positive re-framing. Additionally, lower levels of stress were also associated with an increase in the frequency of binge-drinking. Binge-drinking has been conceptualized as an avoidant coping skill due to its disengagement from the stressful situation (Carver, Scheier, & Weintraub, 1989), while social drinking could be considered an emotional-focused coping skill (Carver, 1997; Williams & Clark, 1998). The correlational nature of the study means that it cannot prove cause-and-effect, only point to significant relationships. Several other factors could have influenced the outcomes found during this study.

5.1.1. Selection/Self-Selection Bias

The two groups used in this study were chosen for their different levels of flight training, but were inherently different at the start of the study for several other reasons. Students who volunteered to participate in the study could have different levels of stress and cope differently than students unwilling to participate. Because not all students took part in the study, the results provide only an estimation of how the larger student population functions. Additionally, not every experienced pilot had an equal opportunity to participate in the study. Only those enrolled in a required flight course were able to participate. Therefore, the possibility exists that the those involved in the study differed

from the overall population; students who elected to complete required courses in the Spring instead of the Fall semester might cope with stress differently than those who chose Fall courses. Also, the assumption cannot be made that more experienced students decreased their stress levels or improving their coping styles over time. While that is one possibility, students with higher stress levels might have self-selected out of the aviation program instead of continuing and gaining more experience. These effects cannot be separated out due to the non-randomization of participants. Therefore, although there is a correlation between flight experience and level of perceived stress, causation cannot be assumed.

5.1.2. Power, Effect Size, and Sample Size

According to Cohen (1992), the ability to detect a statistically significant relationship depends on several factors, including the effect size, the alpha level used, and the sample size. In order for an experiment to have adequate power to detect a relationship between variables with a medium effect size (r = between .15 and .35) using correlations and an alpha level of .05, a sample size of at least 67 respondents is required. Finding a small effect size (r = between .02 and .15) would have required a sample size of well over 500. The population of the current study (n = 79) was adequate to detect a relationship with a medium effect size, but not a small effect size. Unfortunately, however, the total population of aviation flight students at Purdue University is less than 500; the population of interest totals less than 150 students. Increasing the sample size to include the entire population of flight students eligible to participate in the survey in an attempt to increase the power of the study would have been impractical.

5.2. <u>Implications for Future Research</u>

One limitation of this study is its design as a correlative study. Because of its lack

of randomization of participants, a correlative study cannot conclusively prove cause-

and-effect. Also, the current study used a between-person approach to studying coping

skills, which examines the coping skills of groups of people and looks for patterns. An

improvement would be to design a longitudinal study that used a "daily process"

approach to measure how stress level and coping styles changed for each individual over

time. A daily process approach to measuring coping skill usage would involve either a

diary in which participants record their stress level and the coping skills they use on a

daily/weekly basis, or a personal digital assistant (PDA) that queries participants about

their stress level and coping skill usage at randomized points throughout the day. This

would document how stress level and coping skills use changed over time, instead of how

it varies between groups of people. Measuring between-person coping skill usage instead

of for each individual is much less data-intensive, but not as interesting conceptually.

Additional research is needed to provide a much more in-depth analysis of how

coping skill usage affects perceived stress level and changes with prolonged exposure to

high stress levels. More in-depth information about the different reasons participants

engaged in drinking would also help clarify the relationship between stress level and

binge drinking.

5.3. <u>Summary</u>

In conclusion, this study was able to suggest that a difference in stress level exists between experienced and inexperienced collegiate pilots, and that different coping skills are used as a function of stress level. Correlational research does not allow for cause-and-effect relationships to be confirmed, but it raises the possibility that increased flight experience could have an effect on the coping skills that collegiate aviators use to deal with their stress level. Further research using a different type of study would be needed to further clarify this relationship. However, this study does lay a foundation for future research into this area.

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LIST OF REFERENCES

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APPENDIX

APPENDIX

Survey Instrument

1. Age:

   _____

2. Circle your year in college:

| freshman | sophomore | junior | senior | grad student |

3. Circle your current major:

| Aviation Technology – flight | Aviation Technology – non-flight | Other |

4. Circle your gender:

| male | female |

5. Circle your nationality:

| American | Chinese | Indian | Korean | Taiwanese | Malaysian | Indonesian | Other |

6. Write your approximate number of flight hours:

   _____

7. Circle flight licenses/ratings that you hold or are working toward this semester:

| none | student pilot | private | instrument | commercial | multi-engine | flight instructor |

8. Circle the answer that best applies to you:

   1 drink = 12 oz. beer = 1 glass of wine = 1 shot of liquor

   MEN: how often do you have FIVE or more drinks on one occasion?
   WOMEN: How often do you have FOUR or more drinks on one occasion?

| Never | Less than monthly | Monthly | Weekly | Daily/almost daily |

9. Circle the answer that best describes your personality or your typical actions:

I see myself as someone who…	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
…is reserved	1	2	3	4	5
…is generally trusting	1	2	3	4	5
…tends to be lazy	1	2	3	4	5
…is relaxed, handles stress well	1	2	3	4	5
…has few artistic tendencies	1	2	3	4	5
…is outgoing, social	1	2	3	4	5
…tends to find fault with others	1	2	3	4	5
…does a thorough job	1	2	3	4	5
…gets nervous easily	1	2	3	4	5
…has an active imagination	1	2	3	4	5

10. The questions in this section ask you about your feelings and thoughts **during the last month**. In each case, you will be asked to circle **how often** you felt or thought a certain way.

In the last month, how often have you felt...	Never	Almost Never	Sometimes	Fairly Often	Very Often
...upset because of something that happened unexpectedly?	0	1	2	3	4
...that you were unable to control the important things in your life?	0	1	2	3	4
...nervous and stressed?	0	1	2	3	4
...confident about your ability to handle your personal problems?	0	1	2	3	4
...that things were going your way?	0	1	2	3	4
...that you could not cope with all of the things that you had to do?	0	1	2	3	4
...able to control irritations in your life?	0	1	2	3	4
...on top of things?	0	1	2	3	4
...angry because of things that were outside of your control?	0	1	2	3	4
...difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

11. These items deal with ways you've been coping with the stress in your life since you started college. Obviously, different people deal with stress in different ways, but I'm interested in how **you've** tried to deal with it. I want to know to what extent you've been doing what the item says – how much or how frequently. Don't answer on the basis of whether it seems to be working or not – just whether or not you're doing it. Make your answers as true FOR YOU as you can.

When I'm in a stressful situation, I...	I don't usually do this	I do this a little	I sometimes do this	I do this a lot
...turn to work or other activities to take my mind off things	1	2	3	4
...concentrate my efforts on doing something about the situation.	1	2	3	4
...say to myself "this isn't real."	1	2	3	4
...use alcohol or other drugs to make myself feel better.	1	2	3	4
...get support from others.	1	2	3	4
...give up trying to deal with it.	1	2	3	4
...take action to try to make the situation better.	1	2	3	4
...refuse to believe that it happened.	1	2	3	4
...say things to let my unpleasant feelings escape.	1	2	3	4

When I'm in a stressful situation, I...	I don't usually do this	I do this a little	I sometimes do this	I do this a lot
...get help and advice from other	1	2	3	4

people.				
...use alcohol or other drugs to help me get through it.	1	2	3	4
...try to see it in a different light, to make it seem more positive.	1	2	3	4
...criticize myself.	1	2	3	4
...try to come up with a strategy about what to do.	1	2	3	4
...get comfort and understanding from someone.	1	2	3	4
...give up the attempt to cope.	1	2	3	4
...look for something good in what is happening.	1	2	3	4
...make jokes about it.	1	2	3	4
...do something to think about it less, such as watching TV, reading, daydreaming, sleeping, or shopping.	1	2	3	4
...accept the reality of the fact that it has happened.	1	2	3	4
...express my negative feelings.	1	2	3	4
...try to find comfort in my religion or spiritual beliefs.	1	2	3	4
...try to get advice or help from other people about what to do.	1	2	3	4
...learn to live with it.	1	2	3	4
...think hard about what steps to take.	1	2	3	4
...blame myself for things that happened.	1	2	3	4
...pray or meditate.	1	2	3	4
...make fun of the situation.	1	2	3	4

12. What else do you do to cope with stress?