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DECISION FACTORS INFLUENCING STIMULANT USE AMONG FIGHTER AIRCREW DURING COMBAT OPERATIONS

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During long combat missions in fighter aircraft, passive in-flight fatigue countermeasures are often not feasible. As a result, stimulant medications (Go Pills) may be used in-flight. The present study attempts to describe the individual decision factors influencing stimulant use during combat operations.

Methods: 35 deployed F-15E aircrews participated in this study. Prior to the deployment, interviews were conducted to identify factors influencing the in-flight decision to use stimulants. Based on this qualitative information, a novel survey instrument was developed. Results: Surveys were completed after 111 sorties. Results were summarized graphically. Conclusions: Active and anticipated in-flight fatigue were the most common decision factors across all groups. Leadership influence and perceived repercussions were the least influential. Previous Go Pill experiences and in-flight performance were more influential among sorties using stimulants (p<0.001). There were no notable differences in decision factors across deployment experience.

During continuous operations, like those underway in the current combat theater, fatigue represents a significant concern among military aircrews. In a recent survey, 74% of US Air Force aircrews reported flying when drowsy enough to fall asleep (Tan, 2006). Specifically among fighter aircrews, counteracting fatigue is a continuous challenge. During long combat missions, fighter aircrews perform complex physical, cognitive, and emotional tasks without the ability to use passive in-flight fatigue countermeasures. These aircrews, flying in single-piloted tactical aircraft, cannot depend on in-flight napping, activity breaks, or increased cockpit lighting to counteract fatigue (J. A. Caldwell et al., 2009). Often, when passive countermeasures are not feasible, stimulant medications (Go Pills) are used to improve in-flight vigilance.

The use of stimulants is highly regulated and only authorized “after all other fatigue management tools have been exhausted” (Murray, USAF Policy Letter, 2001). Nevertheless, stimulant use in combat is commonplace with 60-65% of fighter and bomber aircrews reporting stimulant use at least once during combat deployments (Emonson & Vanderbeek, 1995; Kenagy, Bird, Webber, & Fischer, 2004). Prior to combat deployments aircrews are required to ground test stimulant medications and attend informal training about stimulant use from the squadron flight surgeon. The authors conducting this study served as fighter squadron flight surgeons and frequently provided this training for combat aircrews. During these training sessions, many aircrews deploying for the first time were noted to ask “when should I take the Go Pill during a combat sortie?”

Many studies have investigated stimulant use in controlled research environments (Bower & Phelan, 2003; J. Caldwell, Caldwell, JL, Darlington, KK, 2003; John A. Caldwell, Caldwell, Smith, & Brown, 2004). However, the decision to use stimulants in these studies is generally controlled as part of the study protocol. In combat, the individual aircrew decision to use stimulants is based on a complex series of in-flight considerations. Military regulations do not specify criteria for in-flight stimulant use and operational fatigue studies addressing this question are few. One study evaluating stimulant use in fighter pilots during the initial phase of
Operation Desert Storm reported that aircrews were instructed to use stimulants “30 min before critical stages of flight if they felt unduly fatigued” (Emonson & Vanderbeek, 1995). Another study of fighter pilot fatigue countermeasures recommends preflight planning of stimulant use in order to avoid a “real-time, fatigue-impaired decision about go-pill use” (Schultz & Miller, 2004). Given the lack of specific guidance and the variability of advice proffered in the operational literature, the present study attempts to describe the aircrew decision to use stimulants in-flight during combat operations.

**Methods**

This study sought to investigate the complex decision to use or not use stimulants during combat operations. Approval for the project was obtained from the Wright-Site Institutional Review Board (IRB) prior to gathering data.

**Study Design**

In 2006, an F-15E fighter squadron deployed to a forward operating location in Southwest Asia. During this combat deployment, F15E crews consisting of a pilot and a weapons systems officer (WSO) flew regular combat missions over Iraq and Afghanistan. The use of stimulants during this deployment was authorized in accordance with USAF policy. Aircrews were allowed to consume either five or ten milligrams (mg) of Dexedrine every four hours or 200 mg of Modafinil every eight hours. During the study period, participants were encouraged to complete a post flight survey as frequently as possible after each combat mission. The decision to use or not use in-flight stimulants was assessed using the novel survey instrument described below.

**Survey Instrument**

Prior to the deployment, detailed interviews were conducted with six experienced F-15E aircrew in order to develop a novel survey instrument. These interviews were conducted to refine our understanding of the factors influencing the individual decision to use in-flight stimulants during combat operations. Based on the qualitative information gathered, we identified 15 primary categories of influence including previous Go Pill experiences, active in-flight fatigue, anticipated in-flight fatigue, preflight fatigue, habit patterns, personal convictions, planned sortie profile, Go Pill availability, crewmate influence, in-flight workload, in-flight performance, perceived repercussions, flight leadership influence, post flight medication effects and command influence. For each category, descriptive statements were developed based on the initial aircrew interviews. Using appropriate descriptive statements, parallel surveys were developed for sorties using stimulants and for sorties not using stimulants. Figure 1 is an example illustrating the questions contained in these parallel surveys. After landing, participants selected the appropriate survey and reported on a visual analog scale the level to which each category influenced their decision to use or not to use stimulants during the sortie.

**Data Analysis**

Survey responses were compared across stimulant use and aviator combat experience using univariate measures of analysis. Results were summarized graphically based on the mean visual analog scale response. For the purposes of this study, a “sortie” was defined as each individual aircrew survey completed. Although some aircrews completed multiple surveys, we included all 111 completed surveys in our analysis under the assumption of independence.
A.

For the following statements, rate the extent to which each factor influenced your decision to USE the Go-pill during this sortie.

1. **In-flight Active fatigue**—I felt tired/sleepy/sluggish or I was having difficulty staying alert so I decided to take the Go-pill.

B.

For the following statements, rate the extent to which each factor influenced your decision to NOT USE the Go-pill during this sortie.

1. **In-flight Active fatigue**—I felt rested and alert so I did not need to take the Go-pill.

*Figure 1.* Example of survey instrument questions portraying the “In-flight Active Fatigue” category for sorties in which stimulants were used (A) and sorties in which stimulants were not used (B).

**Results**

**Survey Population**

The survey population consisted of 35 aircrews, 17 pilots and 18 WSOs, with a mean age of 30 ± 4 yr (range 25 to 41). There were 16 participants with previous combat experience and 19 deploying to combat for the first time. Among the 35 participants, 29 (82.9%) completed a survey after at least one sortie and 18 participants (51.4%) completed surveys after more than one sortie (range 2 to 14 surveys completed). Of the 111 sorties surveyed, the mean sortie duration was 7.6 hrs (range 3.5 to 10.5) and stimulants were used during 39 of the sorties (35.1%).

**Survey Results**

Figure 2 summarizes the survey results compared across stimulant use displayed in the order of influence for sorties using stimulants. The active and anticipated in-flight fatigue categories were strong decision factors for both groups. Stimulant users report that their decision was more influenced by previous Go Pill experiences (p<0.001) and in-flight performance (p<0.001). Sorties not using stimulants reported more influence for the preflight fatigue category (p=0.002). There were no other notable differences between these groups.
Figure 2. Mean survey responses [avg (SD)] comparing sorties using stimulants and sorties not using stimulants. * Tests of statistical significance for univariate differences between sorties using stimulants and not using stimulants were based on Analysis of Variance. Categories showing significance at $p<0.05$ were Previous Go Pill Experiences, In-Flight Performance and Preflight Fatigue.

Figure 3 summarizes the survey results compared across deployment experience displayed in order of influence for aircrew with deployment experience. Again, active and anticipated in-flight fatigue were the most influential categories for both groups. There were no significant differences between experienced combat aviators and those deployed for the first time. It is notable that the categories reported as the least influential across all groups were command, flight leadership, and crewmate influence as well as perceived repercussions.

Discussion

Among fighter aircrews engaged in combat, the decision to use in-flight stimulants was primarily influenced by preflight and in-flight fatigue as well as in-flight performance decrements. Fighter aircrews were not preplanning stimulant use based mission type and anticipated sortie duration (sortie profile) or personal habit patterns. These results indicate that the decision to use stimulants was in line with the guidance prescribed by Emonson and Vanderbeek, suggesting that aircrews use stimulants if they experience excessive in-flight fatigue (Emonson & Vanderbeek, 1995). Although anticipated fatigue was statistically as strong as active fatigue in this analysis, both of these factors involve an in-flight assessment of fatigue rather than a preflight decision.

The decision to use in-flight stimulants was not influenced by aircrew experience. This result indicates that aircrew strategies for in-flight stimulant use do not change with combat experience. Due to the lack of formal guidance, this suggests that these strategies are either intuitive or communicated informally to new aircrews through observation. Additionally, aircrews appear to be satisfied with these decision priorities so they do not change with more
experience. This study did not include a measure of aircrew performance to specifically evaluate the benefits of different stimulant use strategies. Additional studies evaluating performance may reveal strategies, or decision category priorities, that improve combat performance.

![Figure 3. Mean survey responses [avg (SD)] comparing survey responses from aircrews with previous combat experience and aircrews deployed to combat for the first time. Tests of statistical significance for univariate differences were based on Analysis of Variance. No significant differences were found.](image)

Aircrews made the decision to use in-flight stimulants with minimal influence of squadron leadership and minimal concern for post flight repercussions, allowing them to prioritize other decision factors. This finding was consistent across stimulant use and combat experience. Similarly, aircrews in other combat studies have reported minimal “pressure” to use stimulants during long duration missions (Kenagy et al., 2004). These findings contradict media reports suggesting that aviators are occasionally coerced into stimulant use by commanders (Halbfinger, 2003). These findings also contradict the general perception within the fighter community that commanders discourage stimulant use in combat. During this deployment, the lack of leadership influence likely results from local command policies regarding stimulant use. Specifically, stimulant use was approved in advance for the duration of the deployment, there were no command directed limitations, and stimulant medications were readily available.

Acknowledgements

The views expressed in this article are those of the authors and do not necessarily reflect the official views of the U.S. Air Force or the Department of Defense.
References


