THE EFFECT OF MOOD ON PERFORMANCE IN NON-NORMAL SITUATIONS

A Thesis submitted by

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Abstract

Airline passengers' inattention to the pre-flight safety briefing has produced an overwhelming workload on the cabin crew during emergencies as many passengers do not know how to use the safety equipment such as oxygen mask, floatation devices or operate emergency exit doors. Post-accident investigations have confirmed that passenger education will be an effective way to improve safety and increase survival rates. More recently, airlines have used innovative solutions, not considered previously, such as using humour or employing celebrities to deliver the safety briefings with the aim of enhancing passengers' mood and attract their attention.

Mood, with its dimensions of pleasure or displeasure (i.e., happiness, enthusiasm, fright, upset, sadness), can moderate behaviour. Several studies have confirmed the relationship between mood and performance in everyday situations. However, little is known about the relationship between mood and performance in non-normal situations, such as during an emergency aircraft evacuation. The aims of this study were to test the effect of mood (positive or negative) as a performance moderator on passengers' performance during an unscheduled aircraft evacuation; to investigate whether the mandatory pre-flight safety briefing could be employed to manipulate passengers' mood; and to assess an alternative method, such as a reward system, of motivating passengers to pay attention to the pre-flight safety briefing.

In the first experiment, 49 students and staff from the University of New South Wales participated in a simulated aircraft emergency exercise (Experiment 1). Participants were randomised into sad and happy mood manipulation groups and asked to disembark quickly from a mock aircraft. The results revealed that positive mood significantly reduced errors and the time to complete an emergency evacuation.

In the second experiment, 82 university students and staff were randomised to receive one of three styles of pre-flight safety briefing – standard, incorporating humour, and movie-themed – and their recall of safety information was measured. The results showed that a pre-flight safety briefing could influence passengers' mood, but there was a trade-off between entertainment and education: the greater the entertainment value, the poorer the retention of key safety messages.

The third experiment involved 53 students and staff from the University of Southern Queensland, randomised into a control group as well as a reward group (offered a prize for recalling safety messages); their mood was measured before and after the safety video presentation. It revealed that some people react adversely to a reward system, suggesting that a reward cannot be used as the sole means of attracting passengers' attention to safety information. These results have valuable implications for both airlines and aviation governing authorities with respect to improving passenger safety, and add significantly to the scientific literature on mood and performance.

Certification of Thesis

This Thesis is entirely the work of Morteza Tehrani except where otherwise acknowledged. The work is original and has not previously been submitted for any other award, except where acknowledged.

Principal Supervisor: Professor Paul Bates

Associate Supervisor: Professor Patrick Murray

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Student and supervisors signatures of endorsement are held at the University.

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List of Abbreviations

AAIB	Air Accident Investigation Branch (UK)
ANOVA	Analysis of Variance
ASET	Available Safe Egress Time
ATSB	Australian Transport Safety Bureau (Australia)
CAA	Civil Aviation Authority (UK)
CAD	Civil Aviation Department (HK)
CASA	Civil Aviation Safety Authority (Australia)
CRM	Crew Resource Management
ETSC	European Transport Safety Council
FAA	Federal Aviation Administration (USA)
FAE	Fundamental Attribution Error
FSA	Flight Safety Australia
FSF	Flight Safety Foundation
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
JCAB	Japan Civil Aviation Bureau
KAB	Knowledge, Attitudes and Behaviour
MTQ	Motivational Trait Questionnaire
NTSB	National Transport Safety Board (USA)
OTA	Office of Technology Assessment (USA)
PANAS	Positive and Negative Affect Schedule
PED	Personal Electronic Device
POMS-SF	Profile of Mood State (Short Form)
QF	Qantas Flight
RQ	Research Question
RSET	Required Safe Egress Time
SAD	Seasonal Affective Disorder

TC	Transport Canada
TMD	Total Mood Disturbance
TSB	Transport Safety Board (Canada)
UNSW	University of New South Wales
USQ	University of Southern Queensland
VLTA	Very Large Transport Aircraft

Chapter 1: Introduction

Air travel is an increasingly important mode of transport. It is forecasted that air traffic will double within the next decade and despite announcements to end superjumbos' production, major large aircraft customers will receive their orders prior to the closure (International Air Transport Association (IATA), 2017). The safety regulatory framework surrounding aviation operations is correspondingly complex. Aviation regulators are increasingly focusing on passenger survivability to enable a safe and expeditious evacuation of an aircraft during an emergency. According to the ETSC (1996), about 90% of aircraft accidents are deemed to be survivable, and of approximately 1500 people who died each year in air transport accidents, an estimated 600 could have survived with the right technical and non-technical support. In order to reduce passengers' fatal and non-fatal injuries, in emergencies, aviation accident prevention and passenger survivability will continue to be a major focus of airlines and safety regulatory authorities in the coming years.

Studies of human performance in socio-technical environments such as aviation have not extended beyond normal (routine) conditions and are not known how humans perform in non-normal circumstances, such as an emergency evacuation from an aircraft. Even though the available data from previous accidents or incidents provide vast information, which form a trend and notwithstanding similarities between some, no two accidents is identical (Muir & Thomas, 2004b).

1.1. Literature review

The birth of the Ergonomics Research Society of United Kingdom in 1949 and the establishment of The Human Factors Society of the United States (now called the Human

Factors and Ergonomics Society – HFES) in 1957 were direct results of the problems associated with human performance in aviation (Hawkins, 1993). While mechanical failures were viewed as a contributing factor in aircraft accidents during this era, their prevalence within modern aviation has reduced (ICAO, 2003). According to Masys (2004), mechanical problems associated with flight have been largely engineered out of the system; in contrast, human performance or human factors issues remain. In modern-day aircraft, it is estimated that more than 70% of accidents are due to human factors (Committee on Aircraft Certification Safety Management et al., 1998). In order to combat human performance issues, airlines have engaged in various training programs; the most prominent being crew resource management (CRM). CRM, as a subset of human factors training, was adopted initially for flight crew; it was not designed for maintenance engineers or cabin crew who have considerable interface with passenger and cabin safety (Reason, 1997; Helmreich, Merritt, & Wilhelm, 1999). Subsequently, CRM training was introduced to other personnel, such as cabin crew, ramp and technical staff, flight dispatchers, flight planners and other staff who interrelate with flight safety (Dahlstrom, Laursen, & Bergstrom, 2008).

1.1.1. Role of crew members in safety

According to the Australian Civil Aviation Regulations, CAR (2009), the pilot in command is responsible for the operation and safety of the aircraft; which includes the safety of passengers, cargo and the crew. Cabin crew have two distinct responsibilities: passenger service (food preparation and delivery, and ensuring comfort), and (more important, but less visible) the safety of the passengers and the aircraft cabin during normal operations and emergencies.

The role of cabin crew in cabin safety has been highlighted in several air accidents, some of which could have been avoided if the cabin crew had communicated with the flight crew more efficiently (Cooper, 1990). One such example occurred in 1989, when a British Midland Airways B737-400 at Kegworth operating with 118 passengers and eight crew members experienced left engine failure. The flight crew mistakenly shut down the right engine. As the aircraft approached the airport, the captain advanced the power on the failed engine to acquire sufficient thrust for the final segment of the flight. The engine, having been shut down, did not respond and the aircraft hit the ground, fatally injuring 47 of the 126 passengers (Gavaghan, 1990). The lack of crew coordination, and the fact that several people at the back of the aircraft, including the three flight attendants, saw signs of fire from the left engine and did not convey the information to the flight deck, were considered major contributors to this accident (Cooper, 1990).

A similar accident, which further highlighted the importance of the cabin crew's role in accident prevention, occurred in Saudi Arabia in 1980. A TriStar aircraft experienced a cargo fire during flight; the captain instructed cabin crew not to evacuate after landing, despite smoke in the cabin. Crew members saw the smoke but failed to alert the flight crew to their discovery. The result was the total destruction of the aircraft and 301 people killed. According to Barayan (1990), this accident and many similar events result from the competing and conflicting demands (noted earlier) placed upon cabin crew.

Additionally, past aviation accidents illustrate cabin crews' reluctance to take greater roles in emergency situations, and their avoidance of tasks they assume fall outside their jurisdiction or standard operating procedures (Chute & Wiener, 1996). This appears to be most evident when the problem is technical in nature. For example, on March 10, 1989, 24 people were killed when an Air Ontario F-28 crashed on take-off from Dryden, Canada due to an accumulation of ice on the wings (Chute & Wiener, 1996). Hartwick, one of the flight attendants, saw wet snow building up on the wings before the aircraft was airborne, but thought that she should not call the flight deck because she believed that pilots did not welcome operational information from cabin crew. In the past, she felt that she appeared stupid when relating safety concerns to pilots, due to their unresponsiveness and disinterest. In fact, many flight attendants believe that their employers treat pilots with respect but flight attendants more like school children (Chute & Wiener, 1996). Hartwick testified that she perceived that Air Ontario's management was not supportive of flight attendants voicing operational concerns. She also believed that the cabin crew’s technical and operational knowledge was not compatible with that of the flight crew and that they placed an inordinate amount of faith in the pilots being aware of every situation (Chute & Wiener, 1996). Serious flaws, including an industry culture which did not encourage cabin crew to discuss operational matters with the flight crew, underlie this accident (Maurino, Reason, Johnston, & Lee, 1998). Indeed, culture appears to be the only explanation for a qualified cabin crew member hesitating to inform the flight crew with what she believed to be safety critical information that could endanger her own life and the passengers in her care.

1.1.2. Culture

Nowadays, it is commonly believed that the role of culture as a driving mechanism for behavioural outcomes requires greater attention when determining the causes of accident. In order to address the cabin crew’s reluctance to participate in operational matters or their uncertainty during emergencies, it is imperative to understand the influence of the system in which they operate and the way they process information, which define their behaviours. According to Reber (1995), culture is the system of information which translates into codes and becomes the manner in which the people in groups, society and nation interact with their social and physical environment. In this sense, culture is a frame of reference for a set of rules, regulations, and/or methods of interaction within groups. Edkins and Pfister (2004) provides a more complex approach with not much transparency and refer to culture as a simple kind of bucket with dumped phenomena of no explanation. Li and Karakowsky (2001) describes culture as a common set of ideas, values, attitudes and norms that characterise a group of people; it encompasses all sectors of society and influences safety and technology. Other related definitions of culture include “programming of the mind” (Hofested, Hofested, & Minkov, 2010, p. 4), and ‘a social dynamic that sets the framework for interpersonal interactions’ which also provide a common link reflecting how people perform” (Breen, 2008). Perhaps culture’s simplest definition Perhaps culture’s simplest definition is presented by Uttal (1983), - ‘the way we do things around here’. Bloch (1998) argues that culture is connected to language, because culture is conceptual and translated as text through language.

The micro level of individual culture and the macro level of organisational philosophy can interact in both positive and negative ways. Lu (2016) states that the macro level of organisational philosophy, often referred to as the high level (low-resolution), at which management decisions relate to the broad organisational vision consistent with corporate values, objectives and directions, requires imposing rules and procedures to progress towards those objectives. Lu argues that the bottom levels of an organisation are obliged to follow the organisation’s policies and procedures. The micro level of individual culture (higher resolution) involves the individual cultures at the lower levels of the organisation, where they form routine interactions and create group norms which can affect the macro level. For example, cabin crew can take short cuts by ignoring procedures for numerous reasons, including pressure from the organisation or passengers, an attitude that the risk is low and the short cut has worked in the past, self-pressuring due to perfectionism, or lack of personal and professional discipline. All of these issues, derived from cultural diversity, need to be foreseen and managed to maintain a high-quality safety system (Lu, 2016).

Li and Karakowsky (2001) argues that people carry various mental programs within a culture, such as national culture, which can be further divided into:

- Ethnicity: people form their own regional boundaries interact with each other according to their original culture. Those groups hold strong bonds and accept limited changes within the borders within which they live
- Linguistics: produces a barrier for the flow of information
- Age: associated with individual experience and skills
- Professions: such as doctors, pilots and teachers
- Wealth: divides the nation into subgroups in terms of their spending power. It translates into further divisions related to education and employment type
- Social classes: associates with the class in society one may belong to
- Religion: may create widespread friction similar to racial diversities
- Gender: divides the population into male and female groups with their differences
- Generation: grandparents and parents shape children's attitudes
- Politics: correlates with political groups and their policy differences
- Corporate: applies to the culture within the organisations which employ people.

As culture can encompass complex and diverse behaviours and can be detached from corporate goals, it is imperative to account for the cultural barriers embedded within an organisation when constructing a safety culture.

1.1.3. Safety culture

Safety culture, a subset of organisational culture, emerged as a concept from the inquiry into the Chernobyl nuclear power plant disaster in 1986. Reason (1997) endorses the UK Health and Safety Commission's definition of safety culture:

> *The safety culture of an organization is the product of individual and group values, attitudes, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's health and safety programmes. Organizations with positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficiency of preventive measure.* (p. 194)

Equally, safety culture can be defined simply as the way in which safety is managed in the workplace; it often reflects the attitudes, beliefs, perceptions and values that employees share in relation to safety (Cox & Cox, 1991). Hudson, Parker, Lawton, Verschuur, Graaf and Kalff (2000) also defines the safety culture that can be distinguished along a line from pathological stage of caring less about safety than about not being caught, through the generative stage where safety becomes part of the culture and is fully integrated into everything the organisation does.

According to Reason (1997), safety culture has multiple components:

- Professional culture: associated with individuals' discipline and preparedness
- Flexible culture: relating to adaptability and decisions made in a dynamic environment
- Learning culture: an organisation with a positive learning culture will look beyond just acquiring skills that the business requires and continuously challenge its own methods and ways of completing tasks
- Reporting culture: relates to confidential report of unsafe acts or errors without the fear of retribution
- Just culture: a non-punitive reporting culture which supports learning from unsafe acts in order to improve the level of safety awareness which helps to develop conscious articulation and sharing of safety information.

The significance of safety culture and its interrelationship with cabin crew's behaviours is well illustrated in the Australian Transport Safety Bureau's (ATSB) (2001) report of Qantas accident at Bangkok in September 1999, involving a 747 aircraft which overran the runway after landing during heavy rain. Although none of the crew or passengers suffered any serious injuries, the aircraft sustained substantial damage during the accident. According to the ATSB report, several observations demonstrated the company's lack of generative or proactive safety culture; specifically, their hazard identification was primarily reactive and informal rather than systematic and proactive. In addition:

- The company's processes to assess the risks associated with the identified hazards were deficient.
- The design of operational procedures and training was over-reliant on the decision-making ability of flight crew and cabin crew and did not put adequate emphasis on structured processes.
- The management culture was over-reliant on personal experience and did not have sufficient emphasis on structured processes, available expertise, management training, or research and development when making strategic decisions.

Safety culture, as an aspect of organisational culture, influences people's attitudes and behaviours in relation to the health and performance of an organisation (Cooper, 2000). Cooper (2000) believes that many industries show interest in the concept of safety culture in order to be proactive so as to prevent or reduce accidents and serious incidents. Hudson et al. (2000) contends that an organisation's safety culture and responses to unsafe events vary from top management believing that accidents are caused by stupidity, inattention or even wilfulness on the part of employees, through other stages where the conduct of the organisation is woven in safety. Hudson et al. (2000) identified the following categories of safety culture:

- Pathological: the organisation cares less about safety than about not being caught
- Reactive: the organisation looks for fixes to accidents and incidents after they happen
- Calculative: the organisation has systems in place to manage hazards, but the system is applied mechanically. Staff and management follow the procedures but do not necessarily believe those procedures are critically important to their jobs or the operation
- Proactive: the organisation has systems in place to manage hazards and staff and management have begun to acquire beliefs that safety is genuinely worthwhile
- Generative: safety behaviour is fully integrated into everything the organisation does. The value system associated with safety and safe working is fully internalised as beliefs, almost to the point of invisibility.

A correlation between safety culture and risk can be seen in the aforementioned QF1 accident in Bangkok. The company lacked a positive safety culture, as neither the aircrew emergency procedures manual nor the quick reference handbook specified the actions that should be taken in an emergency with a communication failure (ATSB, 2001). It was left to the discretion of cabin crew to execute an emergency evacuation or perform a precautionary disembarkation. Fortunately the cabin crew's instincts prevailed, and the cabin service manager passed the information from the cabin to the flight deck. However, according to the ATSB (2001), miscommunication between flight crew and cabin crew meant some important information available to the cabin crew did not reach the flight deck, meaning the flight crew's decisions were based on information they received about the condition of the cabin. This information included the cabin crew's observations of flashes from an engine during the landing roll, damage to the no. 3 engine pod, cabin floor deformation and fumes in zone A (First Class and Business Class). The absence of information on these issues reduced the flight crew's ability to make the best decision regarding emergency evacuation or precautionary disembarkation.

These events are all indicative of the value of the cabin crew's contribution to the safety of the aircraft, particularly in the absence of clear instructions in adverse events. It is well recognised that many air transport accidents are influenced by the cabin crew and its interface with the flight crew (Orlady & Orlady, 1999). Consequently, modern CRM training consistently emphasises teamwork between flight and cabin crew (Dahlstrom, Laursen, & Bergstrom, 2008). The technical responsibilities of crew are prescribed in checklists which are the basis of their standard operating procedures. However, the non-technical areas are sometimes blurred and require managerial and psychological skill, which may be subject to individual interpretation.

Traditionally, flight crew and cabin crew were separate both in terms of socio-technical and cultural interrelationships. Chute and Wiener (1994) refers to a five-factors model of barriers preventing the flow of information between flight deck and cabin. These factors largely derived from historical differences: pilots were independent and self-reliant, whilst cabin crew originated from nurses and were selected to be compliant and subservient. The physical separation between the two groups also creates completely different environments. The flight deck, with its confined space, is relatively quiet and the personnel are stationary in the performance of their tasks, whereas the passenger cabin is relatively spacious, noisy and socially interactive. Psychological differences are the result of average age (pilots are generally much older than cabin crew), gender composition (pilots are most often male and cabin crew female), attitudes and cultural differences (Chute & Wiener, 1994). Furthermore, the sterile cockpit environment during high workload periods, such as take-off and landing and during flight for cockpit security, provides another barrier, discouraging cabin crew from contacting the flight deck even with legitimate reasons. Chute and Wiener (1994) argues that the most visible obstacle to communication relates to separation into two distinct departments in most airlines, which induces disparities in their manuals, procedures and their training. Although the passenger cabin and flight deck share the same goals, the two types of crew have evolved their own distinct cultures, resulting in communication and coordination problems (Chute & Wiener, 1994; Kanki, Anca, & Chidester, 2019).

It is widely believed that the safety of an organisation is heavily dependent on the existing culture. According to Helmreich, William, Klinect, and Merritt (2001), in aviation, professional, organisational, and national cultures have both positive and negative impacts on the probability of a safe flight. Safety managers should endeavour to reduce the influence of negative culture by promulgating a safety culture that eradicates organisational flaws and improves individuals' safety defences.

From an operational perspective, cabin crews' culture, and therefore performance, has a direct influence on the safe outcome of a flight. The cabin crew's primary role is to ensure passenger safety, but they also need to attend to passenger needs in terms of seating, meals, audio-visual entertainment and cabin hygiene. Often these demands compete, which has the potential to lead to a reduction in cabin safety standards. Cabin crew often have to smile regardless of their actual feelings and be culturally sensitive (Bor & Hubbard, 2006), attending to passengers from a range of cultural backgrounds. Unfortunately, their service activities are more obvious to the public than their safety duties.

1.1.4. Airline safety

Airlines' safety records are based on their safety culture, which has five main components: organisational commitment, management involvement, employee's engagement, rewards and reporting systems (Thaden, Wiegmann, Mitchell, Sharma & Zhang, 2003).

Organisational commitment refers to the extent to which management identifies safety as a core value for the organisation (Eiff, 1999). Eiff believes that the management should actively participate in critical safety activities with a reward system for employees' safe behaviour. Empowering employees and enabling them to engage as the delegate of the authority can increase motivation to maintain a sound safety system (Geller, 1994). It is also essential that airlines establish a comprehensive reporting system for identifying safety flaws and weaknesses and learn from past incidents and accidents to proactively enhance their safety systems (Eiff, 1999).

The role of cabin crew and their coordination with the pilots and ground staff in rescuing passengers during an emergency evacuation must not be underestimated. Cabin crew failing to highlight and undertake the proper procedures has led to both fatal and non-fatal outcomes during flight emergencies. Thaden et al. (2003) surveyed airline employees and found some areas of vulnerability within their safety culture. First, respondents did not significantly differentiate between organisational commitment and management involvement as it appeared they form a single cell and their differences are only apparent, depending on the size of organisation and its structure. Second, employees did not perceive safety culture as a set of values, traits, beliefs or norms to be shared with other employees (as defined by Niza, Silva & Lima, 2008). In their opinion, safety culture was not about safety consequences or safety processes; it depended on the situation – for example, cost effectiveness, or if pilots were involved in incidents. Finally, the survey participants made many comments about safety behaviour which must be an integral component of pilots' status, not an add on, as stated in the survey that should be specifically rewarded (Thaden et al., 2003).

1.1.5. Production and protection

Business competitiveness and the rise of other expenses in the airline industry create serious concern when commercial goals come into conflict with safety issues; Rosness et al. (2004) refers to this problem as "the boundary of financially accepted behaviour with regard to risk" (p. 44), or production versus protection. One technique for reducing expenditure in the airline industry is to hire cabin crew from the countries to which the airline flies, to minimise crews' travel expenses (Maszczynski, 2018). Whilst the strategy provides significant reduction in an airline's immediate expenditure, the cultural differences between cabin crew can produce long-term safety concerns. The question is whether these differences are latent conditions which have to be addressed, negated, which may be seen by some managers as calculated risk, or adjust the employment policies for reasonable payments and impartial treatments.

1.1.6. Mood and performance

While the relationship between mood and performance in normal conditions is widely studied, the researchers' review of the literature failed to find any research on the relationship between mood and performance in non-normal situations. Hence, how mood affects performance in situations that are not part of routine experience remains unknown. A hazardous environment, such as aviation, would be an ideal setting for such research and commercial travellers can benefit from mood-performance congruence by utilising those concepts during critical events such as emergency disembarkation. Critical situations are often those circumstances when an unpredicted event such as a forced ditching, fire or smoke in the cabin require passengers to exit the aircraft in the shortest possible time; if mood has a significant influence on performance, then mood is also an important safety factor. The lack of literature in this area is perhaps due to the nature of unanticipated events, which mean that researchers cannot be present to collect data in the real time and also accident investigation authorities impose restrictions to collect data due to the sensitiveness of the investigation immediately after an incident.

For airlines, the delivery of the pre-flight safety briefing prior to a flight is not only an opportunity to inform passengers about the safety features of the aircraft, but a chance to positively influence their mood and improve their recall performance in the event of an emergency. The effect of mood on performance under routine (i.e., daily) conditions is well documented. Pleasant/positive moods such as happiness or elation have been shown to improve intellectual performance (i.e., verbal and quantitative ability – Albarracin & Hart, 2011), task interest (Hirt, Melton, McDonald, & Harackiewicz, 1996), creativity (Montgomery, Hodges, & Kaufman, 2004), teamwork (Barsade, 2002), decision-making (Barsade & Gibson, 2007) and life meaningfulness (King, Hicks, Krull, & Del Gaiso, 2006).

When considering passengers' performance and behaviour during non-normal situations, it is important to know whether or not they can be controlled or manipulated. Mood is known to influence cognition and behaviour and can be used to improve performance (Lane, Terry, Beedie, Curry, & Clark, 2001). Related work shows that exercise can enhance energy and reduce tension, thereby positively influencing mood, which can ultimately affect individuals' behaviour (Thayer, Newman, & McClain, 1994). Other manipulative strategies can improve performance; for example, the use of nutritional supplements (Petróczi, Naughton, Mazanov, Holloway, & Bingham, 2007) or environmental design (Roelofsen, 2002). Although various strategies have been employed to manipulate mood, some may not be practical in relation to mood–performance congruence in the passenger cabin of an aircraft. Therefore, the study described in this thesis investigated the efficacy of using mood to influence performance under stressful conditions (e.g. aircraft emergency evacuation), and rewards as a means of encouraging passengers to learn about the safety features of their aircraft.

Many studies have investigated the interrelationship between mood and performance and have found a positive correlation between the two (Zohar, 1999; Totterdell, 1999). For example, Barsade and Gibson (2007) noted that people with positive mood receive information more effectively than people with negative mood, who struggle to capture information and are less capable of handling their task. However, as noted earlier, studies of the relationship between mood and performance have consistently focused on everyday situations involving routine and non-threatening life events. Zohar (1999) noted that military parachute jumpmasters' daily mood was related to the daily activities and irritations they faced, as well as their workload and self-reported fatigue. Zohar used a combination of scales for measuring participants' mood. He used Watson, Clark, and Tellegen's (1988) Positive and Negative Affect Schedule (PANAS) for negative mood, and assessed fatigue using the Profile of Mood State (POMS) questionnaire (McNair, Lorr, & Doppleman, 1989). Also, Totterdell (1999) used pocket computers to measure cricketers' moods and performance three times a day for up to four days during a cricket competition. Utilising correlation analysis and pooled time series analysis, Totterdell was able to show that the players' performance was related to their happiness, enthusiasm, energy and confidence during the competition. The results suggest that the cricketers' performance was directly influenced by their mood.

To optimise performance and enhance safety, mood needs to be positive. When mood is negative, it hinders performance, and errors are likely to occur (Parker, Reason, Manstead, & Stradling, 1995). Therefore, mood manipulating strategies have to be carefully selected to prevent adverse effects. Several mood manipulation strategies and techniques have been employed to influence mood. For example, Richards and Whittaker (1990) were able to influence participants' mood by simply showing them three pleasant photographs taken from a newspaper (a baby and two scenic views). In contrast, De Dreu, Baas, and Nijstad (2008) used an autobiographical memory task to manipulate mood states by requiring participants to write about an experience which had provoked specific feelings such as anger, sadness or happiness. This method required participants to report keywords or phrases that evoked the designated feelings.

1.1.7. *Concise learning and memory*

The importance of memory and how it functions requires to be highlighted because of the need for passengers to learn and remember the safety information airlines provide prior to each commercial flight. Memory is composed of several separate systems and subsystems (Squire & Shrager, 2008). According to Roediger, Zaromb, and Goode (2008), there are numerous types of memories: verbal memory, visual/spatial memory, autobiographical memory, collective memory, haptic memory (memory of skin sensations), procedural memory, declarative (conscious knowledge of the facts and events) and nondeclarative memory (non-conscious knowledge of systems that provide skills and habits), amnesia (kinaesthetic memory, for muscular movements), episodic memory (the ability of retrieving information from past events) and semantic memory (for specific events). Episodic, semantic and declarative/nondeclarative memory are the types of memory most relevant to pre-flight safety briefings.

Episodic memory is the ability to retrieve information from past events, which can be manipulated over time (Roediger et al., 2008). It refers to memory of specific events, such as the most recent Christmas dinner with a particular family member (Szpunar & McDermott, 2008). However, Szpunar and McDermott assert that semantic memory is nonspecific (such as ‘elephant living in Africa’). Jones, Willits, and Dennis (2008) believe that semantic memory is the hard-wired information which provides meaning to words we utter or general knowledge without any alterations, such as colours or names. Declarative memory provides connection with the outside world and refers to the capacity for remembering the facts and events perceived in everyday life (Squire & Shrager, 2008). Squire and Shrager believe that declarative memory can be used to guide successful performance and is suited for rapid learning, such as how to combine two different words. Finally, nondeclarative memory refers to acquisition of knowledge unconsciously in the form of motor skills, habits and experience-dependent behaviour which is expressed through performance rather than recollection (Squire & Shrager, 2008).

Learning memory can be seen as the storage of information which can influence behaviour. It is memory that allows organisms to act in a certain way given certain circumstances (Pribram, 1972). Pribram claims that psychologists should note not only how information is stored but the mechanisms for retrieval. Pribram also refers to the paradox of experience and behaviour, which is that we are not aware of some experiential influences on our behaviour. In fact, the reaction (behaviour) can be influenced by the reflex (experience) or the reflex can be affected by the behaviour (Pribram, 1972). Goleman (2011) argues that under certain conditions the limbic brain can overwhelm or highjack the body (known as amygdala hijack) to respond to a perceived threat with impulsive reaction and out of proportion. These conditions can impact on explicit or conscious (direct), implicit or unconscious (indirect) and special (visual) memory(Goleman, 2011).

1.1.8. *Music and emotions*

It is widely believed that music can influence emotional states, which in turn can affect performance. The literature suggests there is a strong correlation between music and emotion (Moon, Kim, Lee, & Kim, 2014). Music can induce powerful emotional states and physiological effects (Krumhansl, 1997). According to Krumhansl (1997), sad music can degrade mood and lower the heart rate, blood pressure and skin conductance, (i.e., skin responds more like an insulator) while happy music can enhance mood and increase the respiration rate. These changes were only partially replicated for non-musical emotions. Krumhansl (1997) states that purely instrumental music can induce strong emotional reactions, indicating that emotions caused by music are not exclusively dependent on verbal content. Likewise, physical responses such as tears and shivers are associated with harmonies. Other studies reveal a more complex interrelationship between emotional states and music. Some authors believe that music is the language of emotions, while others dismiss that notion and suggest that while music listeners communicate knowledge amongst themselves, the process does not consider individuals' personal experience (Lesiuk, 2005). Furthermore, Lesiuk argues that mood states occur because individuals project their past experience onto a rhythmical or non-rhythmical tone displayed by music.

Music has been found to be an effective way to manipulate mood state and maintain it for a prolonged period (Zwaag et al., 2012). Zwaag et al. examined the behavioural and corresponding physiological aspects of music on motorists and found that music can successfully maintain mood while driving. Lesiuk (2005) claims that music can be used in anxiety treatment, and specifically that familiarity and past experience with music may have a more profound effect on behavioural changes than the type of music. Music is believed to enhance work performance, and when removed, the psychological withdrawal of that stimulus can demote mood, lower the quality of work and require a person to spend more time on a task than originally intended (Lesiuk, 2005). According to Lesiuk (2005), age is also an important factor in the correlation between emotional states and music. Studies have revealed that there is a significant negative correlation between age and time spent listening to music (Lesiuk, 2005).

Brainstorming as a method of extracting unique ideas from individuals who remain within the context of a topic, is another demonstrated mode of influencing mood. De Dreu et al. (2008) used this method to manipulate subjects' mood state by extracting their ideas (creativity) in the context of teaching methodology.

Notwithstanding the strong interrelationship between emotional states and music, psychological studies of emotion rarely use music as a stimulus and the literature contains only occasional references to music. Researchers usually use naturalistic and often complex material, such as films and pictures, to manipulate mood (Krumhansl, 1997). It is believed that the changes to emotional states induced by music are not necessarily the same as emotions caused by non-musical material. The reason for the difference between musical and non-musical stimuli is beyond the scope of this study.

1.1.9. Humour and mood

Humour is known to be an effective tool for manipulating mood, as it is said to lower stress and anxiety (Abel, 2002). Abel used undergraduate students' self-reported sense of humour to divide them into high or low humour groups, as determined by one standard deviation above and below the mean. The high-humour group displayed less stress and reported less anxiety than the low-humour group, despite experiencing similar daily problems within the previous two months. Abel argued that the high-humour group was using more problem-solving strategies in terms of coping with stress and as a result, lowering anxiety compared to the low-humour group. The study demonstrates that a wide range of experiences can influence mood, including simply thinking about a past event and environmental and sensory experiences like music or lighting.

Some air carriers, such as South West Airlines, believe not only that humour can be used as a tool to capture passengers' attention, but it will improve the relationships between an airline's staff and passengers. According to Wrench, Millhouse, and Sharp (2007), the concept was stated officially by the airline's director for customers as follows:

We encourage our flight attendants to be casual and forthright. We are not afraid of song or humor during the presentation because when our flight attendants use their personalities, talents and senses of humor this results in a better relationship with customers. (p. 383)

Other airlines, such as Air New Zealand and Virgin America, have introduced innovative pre-flight safety briefings containing laughter, jokes, songs and colloquialisms, or using actresses in nun's costumes for their safety demonstration (Meltzer, 2017).

1.1.10. *Odds against humour*

Despite some airlines innovating use of humour and celebrities to attract passengers' attention to pre-flight safety briefings (FSA, 2001), other studies have revealed that humorous safety briefings are less rational and actually have a reverse effect. Flight attendants can lose their credibility and humorous pre-flight safety briefings were not found to be arousing (Wrench et al., 2007). A feature of humour is production of an initial ambiguity by using words or sentences that have more than one meaning, and, according to Ross (1998), humour is often created out of conflict between what is expected and what is delivered. For example, "Do you believe in clubs for young people?", "Only when kindness fails" (p. 7). It is sensible to presume that the word 'club' is used as a place of entertainment or leisure, while the punchline refers to a form of violent punishment (Ross, 1998).

Ross (1998) believes that the context in which humour is used is critical and depends on whether or not the audience find it amusing. Ross affirms that because humour is a matter of personal taste, it is unlikely that any two people rate a joke the same way. Ross even asserts that personal taste for humour can change overtime, and some jokes become outdated and lose their attraction. Moreover, we laugh at the misfortune, stupidity, or moral or cultural defects of the people in the joke, to whom we feel superior because we were not in that situation at that time (Terrion & Ashforth, 2002).

Romero and Cruthirds (2006), in line with Wrench et al. (2007), believe that some people perceive humour as positive while others see it as arrogance. Consequently, humour can be perceived as positive or negative by individuals, and when viewed negatively, it can generate derision, which can alienate people within their circumstances (Romero & Cruthirds, 2006). Furthermore, depending on the ethnic background of passengers, certain humour styles can be detrimental to interpersonal relations (Maples et al., 2001). Generally, by considering a group of people with shared views of ‘sense of humour, other groups with different views would be regarded as ‘outsiders’ (Terrion & Ashforth, 2002). Maples et al., (2001) believe that humour, despite its advantages such as increased group cohesion and reducing stress, is valued differently, hence it can cause disturbance and distraction because of people’s cultural diversities and dissimilar views. This is further supported by Lyttle (2007), who refers to the downside of humour, asserting that humour can distract, hurt credibility and be offensive in certain circumstances.

More recently, Tehrani and Molesworth (2016) studied mood and its correlation with performance in non-normal conditions. They found people in a good mood outperform those who are in a bad mood. Furthermore, Tehrani and Molesworth noted that some mood enhancement strategies, such as utilisation of humour or presentations by celebrities, despite their direct mood improvements, have inverse effect on information retention (i.e., memory) because they can hide the core message and distract the observer (Tehrani & Molesworth, 2015). Tehrani and Molesworth believe that safety information retention is a vital component of performance output during non-normal conditions. Hence, there is a need to revisit cabin safety and devise techniques to ensure that the pre-flight safety briefing information successfully penetrates recipients' minds. It is also essential to ensure that the safety messages are retained for the entire journey, as opposed to just the first few hours of a long flight.

1.1.11. Light and mood manipulation

Light has been used to manipulate mood. According to Knez and Kers (2016), different age groups react differently to light when it is used as a mood manipulator. For example, younger participants tended to preserve negative mood best in warm reddish light and least in cool blue or white lighting while working with a battery of cognitive tasks; this was reversed for the older participants. Despite increasing use of light to influence mood during long-haul flights (Owen, 2016), the link between the two is not within the scope of this research.

1.1.12. Motivation, performance and rewards

As noted earlier, manipulation of mood can improve performance and safety. Muir and Thomas (2004) used financial incentives to manipulate egress time in an emergency evacuation as financial rewards can be motivational for the decision-making process (Ding & Beaulieu, 2011). The financial incentives may provide the airlines with some insight into simple and effective method of positively influencing passengers' behaviour during emergency events (Muir & Thomas, 2004b).

Recent studies support the link between rewards and memory consolidation. Murayama and Kitagami (2014) found that extrinsic rewards can enhance memory through a dopaminergic modulation process. Dopaminergic effects increase dopamine activity in the brain through neurological transmissions which are regarded as memory enhancement (Shohamy & Adcock, 2010). Shohamy and Adcock (2010) also believe that dopamine ensures that memories would be relevant and accessible for the future information retrieval and adaptive behaviour. Murayama and Kitagami (2014) further state that there is a rewards pathway (i.e., a mesolimbic system) in the brain that extrinsic rewards can activate. This notion is further supported by Bialleck et al. (2011), who showed that extrinsic reward enhances memory performance. Studies to date have not found a direct link between extrinsic reward and motivation and attention, but strong incentives drive people to pay attention and become engaged in learning tasks (Murayama & Kitagami, 2014). Consideration could be given to using this method to attract the attention of airline passengers to the safety presentation prior to the flight.

Shohamy and Adcock (2010), in reviewing evidence for adaptive memory, noted that there is a correlation between events that have motivational significance and multiple mechanisms such as dopamine, which controls memory. Shohamy and Adcock used food as rewards for animals while observing the hippocampus system (a critical system in the brain which affects long-term memory). In humans, it was found that the hippocampus can create building blocks for memory-guided behaviour. Wimmer, Braun, Daw, and Shohamy (2014) also found that reward learning is guided by past associations between stimuli and rewards.

The notion of a direct correlation between rewards and performance has been studied with respect to organisations and entrepreneurs. It is believed that implementing a reward system is the best way to improve individual performance (Hamukwaya & Yazdanifard, 2014). Hamukwaya and Yazdanifard claim that performance is based on ability, motivation and resources, and that for greater performance, all these factors have to be enhanced. Hamukwaya and Yazdanifard conclude that provided organisations have sufficient resources and their employees are trained well with the required skills, then the motivational factor has to be shaped. This conclusion has been supported by others, who believe both motivation and performance can be enhanced by a reward system and the negative effects of rewards can be negated (Cameron, Banko, & Pierce, 2001).

1.1.13. *Performance and memory*

Performance, memory, motivation to learn and stimuli are discussed widely amongst researchers as separate topics with outcomes, often as profits or scores. People rely on memory to make decisions based on their circumstances. Pribram (1972) notes that researchers have long been aware of the differences between recall and recognition, and short and long-term memory spans, and are concerned not only with memory storage but with how to retrieve it. Pribram (1972) states that recognition uses a short-term mechanism, which is instantaneous (e.g., how many faces can be recognised per second) and long-term memory, which is practically unlimited (e.g., "you look just the same as when I saw you twenty years ago"). Other complex issues, such as the paradox concerning the unintentional influence of experience on behaviour or the difference between reflective action and mind, have also been considered. These issues may have negative consequences on passengers bebhaviour when they need to refer to their memory and retrieve the safety information.

1.1.14. Passengers' attention to safety information and survivability

Galea, Finney, Dixon, Siddiqui, and Cooney (2006) found a direct correlation between passenger behaviour and survival. For example, in an investigation of 49 survivable accidents, Galea and his colleagues noted that seat-climbing behaviour was a normal part of passengers' exit strategy during an emergency evacuation. The number of seats passengers climbed over ranged widely, from one to 13. Other factors, such as social and family bonds between members, were also noted as having an effect on the speed of evacuation. Understandably, family members sought to ensure that each member of their group was able to safely evacuate (Galea et al., 2006). Such behaviour undoubtedly affects the egress time in an emergency, which, as noted previously, is not taken into consideration when aircraft are tested in relation to the 90 seconds certification requirement. This weakness is acknowledged by Thomas, O'Ferrall and Caird-Daley (2006), and suggests that passengers should be encouraged and motivated to learn about the safety aspects of their journey and optimise their performance prior to each flight. However, it is known that despite airlines' effort to capture passengers' attention and inform them of their obligations by demonstrating and explaining how to use aircraft safety apparatus prior to each flight, many passengers ignore this vital information and look around or talk to each other (FSF, 2000).

1.1.15. Reward benefits

Knowledge alone is not sufficient to guide any successful course of action; a reward as an extension to a motivational process is needed for satisfactory performance (Ostlund, Winterbauer, & Balleine, 2008). Capturing attention by rewarded stimuli seems to become more noticeable (Palmer, Davies, Nguyen, Berndt, & Miranda, 2014). Palmer et al. believe that stimuli associated with rewards such as food or money can capture attention, even in tasks in which they are not relevant to the user's objectives. Palmer et al. asked research participants to use a gamified tool (videogame-type format) to identify target shapes in preference to target colours. Participants were initially rewarded for pinpointing certain shapes, then asked to select oddball coloured targets, without reward. The second phase of colour identification was significantly slower because it was distracted by the rewarded shapes' phase. The finding reveals that participants prioritised the identification of rewarded shapes over non-rewarded coloured targets. However, the technique may not be suitable for air travellers as not all passengers will be competent or keen to participate in games.

The concept of motivation has been studied in rats, revealing that most aspects of their behaviour are goal driven with the exception of some reflexive responses. A distinctive difference between goal-driven and reflexive responses is that goal-driven responses are controlled by consequences, while reflexive responses are not (Ostlund et al., 2008). For example, Ostlund et al. trained hungry rats to press a lever for a particular type of food pellet and noted that it was the reward value of the food pellet that motivated hungry rats to work more vigourously than the sated ones. Ostlund et al. established that the motivational state of rats was the major determinant of their performance.

Rewards for improving performance is now a widespread practice amongst many institutions, from the management team to the most junior employees. Hamukwaya and Yazdanifard (2014) state that rewards are the best way to enhance performance, because they can produce motivation and reduce, for example, employer–employee conflicts. Hamukwaya and Yazdanifard further elaborates on three main factors which determine performance: resources, ability to perform, and sufficient motivation. The success and failure of organisations will depend on their resources, the skills and competencies of their employees, and whether employees are sufficiently motivated to carry out their duties. Rewards can take various forms such as salary increments, bonuses, allowances, promotions or holidays (Hamukwaya & Yazdanifard, 2014).

According to Flora and Flora (1999), 22 million children in Australia, Canada and the United States participated in a rewarded reading program called Book It!, conducted by the Institute of Human Science at the University of Rhode Island. The experiment sought to identify the relationship between extrinsic rewards and intrinsic motivation. The study surveyed 2741 teachers representing 16,130 students, and revealed that the learning attitude of participants following the program improved by 61%, reading level by 69%, and enjoyment of reading by 80%. The authors state that “the basis behind the program was to offer immediate positive reinforcement to reward individual accomplishments. It was this rewarding of effort and not ability that probably made ‘Book It’ so attractive to both teachers and students” (Flora & Flora, 1999, p. 10).

In another study, conducted by Eisenberger, Rhoades, and Cameron (1999), participants were offered monetary rewards to meet or exceed the required performance during a learning phase. The group was compared with a control group which had free time and was unrewarded. The results confirmed the study's hypothesis that the rewarded group would have higher intrinsic motivation than the nonrewarded group. In line with Eisenberger et al., Cameron, Pierce, Banko, and Gear (2005) found that, in general, rewards have no negative effect on motivation when performing a task, and negative effects are only found when rewards are expected and offered beforehand.

1.1.16. Reward disadvantages

Although many benefits, such as achieving defined goals, raising willingness to take on challenging tasks, and overall improved efficiency, accrue when a reward system is introduced (Hamukwaya & Yazdanifard, 2014), there are also disadvantages, such as neglect of unrewarded tasks, competition instead of cooperation, lack of openness and initial higher cost (Irs & Türk, 2012). While some studies proclaim that extrinsic rewards can affect intrinsic motivation, others find otherwise. (Intrinsic motivation behaviours relate to situations in which there are no rewards except the activity itself (Cameron et al., 2001). Conversely, extrinsic motivation is said to occur when activity is rewarded by incentives that are not inherently included in the task. Moreover, when rewards lower interest in or performance on the task, it is claimed that the rewards undermine motivation (Cameron et al., 2001).)

In 1994, Cameron and Pierce published a meta-analysis of 96 studies, and based on their findings argued that the negative effect of rewards on motivation were minimal and could be easily prevented in applied settings (Cameron, Banko & Pierce, 2001). Furthermore, Cameron et al., (2001) found that in general, rewards are not harmful to motivation to perform a task and negative effects are found on high-interest tasks when the rewards are offered beforehand. However, Deci, Koestner, and Ryan (1999), on examining 128 experiments on correlation between rewards and motivation, found that rewards have substantial negative effects on intrinsic motivation. The notion of rewards decreasing intrinsic motivation has captured the attention of researchers, as it suggests that rewards used in schools, hospitals and workplaces can be more harmful than beneficial (Cameron et al., 2001).

Arguments over the benefits and disadvantages of rewards for motivational behaviours led the researchers to undertake a more comprehensive assessment of the findings of Cameron and Pierce (1994). Cameron et al. (2001) found no evidence of negative effect when intrinsic motivation was measured. However, due to diverse effect sizes in the experiments, they conducted further analyses to determine the circumstances in which rewards could produce negative effect. The effect size is found when converting the findings from each study into standard deviation units in order to compare two groups on a common dependent measure. Hence, rewards were categorised by their type (i.e., tangible and verbal) and the tangible rewards were further subdivided into expected and unexpected. Cameron and Pierce (1994) found that rewards could only have negative effect if they were tangible and expected. Eisenberger and Cameron (1996) and Cameron et al. (2001) came to the same conclusion.

Other researchers did not accept the aforementioned meta-analyses and claimed that the studies had shown conflicting results. The most recent meta-analysis, conducted by Cameron, Pierce, Banko, and Gear (2005), resolved the differences between previous studies. In a study with high relevance to pre-flight safety briefings, they assessed how intrinsic motivation is affected when participants are rewarded for achievements while learning an activity, performance on a test, and both. They classified the designated tasks into low-interest and high-interest tasks. Cameron et al. (2005) found that rewards increase intrinsic motivation and performance on tasks that are of low interest. On high-interest tasks, participants achieved higher scores on performance when they were verbally praised for their achievements, presented with tangible rewards in an informational manner, when rewards demonstrated their competence in an activity, or when rewards were offered for achieving performance standards or task objectives. Other researches, such as Pierce, Cameron, Banko, and So (2003) support the notion that intrinsic motivation increases when participants are offered rewards for meeting standards.

Aviation, as a socio-technical and high-risk environment, is highly dependent on human performance (Marx & Westphal, 2008). With the substantial growth in the number of air travellers each year, aircraft manufacturers are considering designs capable of carrying an increased number of passengers, and for this reason aircraft safety is becoming even more crucial, not only to prevent future accidents, but to improve passenger survival rate in the event of an accident (ETSC, 1996). Furthermore, the airline industry attracts considerable negative media attention and suffers adverse publicity in the aftermath of an accident or serious incident (IATA, 2012), which is bad for business.

1.1.17. Passenger behaviour

Traditionally, aviation accident reports have given more attention to the flight crew of an aircraft than to the cabin crew and passenger safety (BEA, 2012). These reports do not sufficiently address the safety requirements of the aft section of an aircraft (i.e., the passenger cabin) in assuming that, its lower technical complexity means it can be considered an add-on component to the more important section of the aircraft – the cockpit. Many fatal and non-fatal injuries have been caused by erroneous passenger behaviour following an accident (PCA, 1982). All too often, during emergency evacuations, inhalation of toxic gases from smoke and fumes has hindered passengers’ escape from the cabin and caused serious and fatal injuries (Mayday, 1988). In addition, factors like passengers scuffling during evacuation and exposure to hazards in the cabin due to prolonged time to exit the aircraft has caused fatal injuries (NTSB, 2000). According to the United States National Transport Safety Board (NTSB), during a runway collision of a USAir 737 and a SkyWest Metroliner at Los Angeles Airport in 1991, all passengers of the Metroliner were killed (NTSB, 1991). Although, there were no fatal injuries on the 737 as the result of the impact, 20 passengers died due to smoke inhalation or heat exhaustion as they were queued at the overwing exit. The NTSB discovered that two major factors contributed several seconds to evacuation delays: scuffles between passengers and the inability of passengers to open the doors (NTSB, 2000).

There are other circumstances where miscommunication between the flight crew and the cabin crew has been flawed and the disharmony between the two sections has exacerbated an emergency situation. For example, in 2010, the flight crew of a plane which landed in Glasgow airport was totally unaware that the cabin crew had conducted an emergency evacuation of the passengers, during which some were injured (AAIB, 2014). Hence, despite rigorous crew training and regulations for rapid disembarkation which require systematic coordination between flight crew and cabin crew following specific instructions, the industry still experiences fatal and non-fatal injuries. These situations exemplify the importance of cabin safety and the need to better understand passenger behaviour and safety during an emergency.

Aircraft cabin safety management, passengers' performance and behaviour during emergency evacuation have been largely overlooked by researchers and governments until recently (Galea, Finney, Dixon, Siddiqui, & Cooney, 2006). The Canadian Transport Safety Board (TSB) revealed that between 1978 and 1991, 18 Canadian and three foreign aircraft conducted emergency evacuations in Canada (TSB, 2013). The 21 occurrences involved 2,305 passengers and 139 crew members, and resulted in 91 fatal and 78 serious injuries. Thirty-six of the fatalities and eight of the serious injuries occurred during the evacuation stage. Passenger performance and behaviour during emergency evacuation were recognised as the main determinant of passenger survivability. When passengers are faced with an unexpected life-threatening situation, they often react unpredictably, which can encompass screaming, hysteria, aggressiveness and crying or negative panic, which is revealed as inaction or freezing (Barthelmess, 1988; TSB, 2013). Generally, most delays in emergency evacuations are due to passengers' counterproductive and uncooperative behaviour, which has the potential to cause serious consequences.

1.1.18. The 90 seconds rule

The Civil Aviation Safety Authority (CASA) in Australia has mandated airlines to brief passengers on emergency procedures prior to every flight (CASA, 2009; CASA, 2014). It also requires airlines to comply with a 90 seconds rule regarding emergency evacuation (Chang & Yang, 2011). Specifically, the 90 seconds rule is a condition imposed by the United States Federal Aviation Administration (FAA) on large jetliner designers, manufacturers and the airlines to demonstrate that during emergency conditions such as cabin fire and smoke, all passengers and crew members are able to exit the aircraft cabin safely with half of the usable exits blocked and minimum floor lighting in less than 90 seconds (FAA, 1999). This rule is intended for scenarios in which specific emergency exit doors cannot be opened due to malfunctions or should not be used because of fire outside the aircraft which can be blown into the passenger cabin with an unfavourable wind. The requirements of this rule do not take into consideration passenger behaviour in terms of social and family bonds (Galea et al., 2006) nor the carriage of infants, crew behaviour, passenger management (Court & Marcus, 1997), passengers' memory and training (Miyoshi, Nakayasu, Ueno, & Patterson, 2012), or factors such as how fatigue affects performance (Hendrick & Lilly, 1970).

1.1.19. Pre-flight safety briefing

The pre-flight safety briefing is meant to inform passengers about the safety features of the aircraft. In essence, the briefing is designed to inform or remind passengers of safety procedures and their responsibilities while they are on board. The safety briefing typically covers information about the location of lifejackets, how they should be worn, the location of emergency exit doors, operation of seat belts, and the use of electronic devices during take-offs and landings. Some passengers find the safety information delivered prior to the flight boring, repetitious and in some cases unhelpful (FSF, 2000).

In line with the governments' regulatory requirements, the time designated for the pre-flight safety briefing could be a unique opportunity for the airlines to improve/optimise their briefing, in terms of the delivery method to capture passengers' attention. Moreover, akin to the mood and performance relationship in normal conditions, pre-flight safety briefing could be used to improve passengers' mood in order to enhance passengers' performance for unpredictable events such as an emergency evacuation.

Some airlines have considered optimising the safety briefing, as noted earlier, made changes such as embedding humour in pre-flight safety messages or employing recordings of movie stars informing passengers about their obligations about the safety features and services of the aircraft. However, it is not known if these techniques have been effective in improving passengers' recall of safety messages. It is extremely difficult to cater for all age groups, genders, cultures, languages, frequent flyers and first-time travellers, prior knowledge, social bonds and psychological disorders when designing a safety briefing. This is further compounded by the short period in which the safety briefing has to be delivered.

It has not yet been verified if passengers' mood can be manipulated through the presentation of a pre-flight safety briefing by celebrities or movie stars. Furthermore, it is also important to learn if positive mood translates into improved retention of information contained within pre-flight safety briefings. Passengers' optimum performance at an unscheduled rapid disembarkation is highly contingent on their ability to recall and apply information from the pre-flight safety briefing.

1.2. Aim and limitations

For ethical reasons, the present study used simulation as opposed to a real-life accident. The use of scenario-based simulator research is very common in aviation. Pilots and cabin crews are regularly trained in simulators, as simulation allows for the control of certain variables, and of course minimises the likelihood of injuries (Mejias & Eng, 2012). It is important to acknowledge that there may be variations in performance between the two environments. Matching reality and simulated scenarios during experiments is a problem all researchers face, not just those in aviation.

The main aim of this research is to investigate the effect of mood on performance in a non-normal situation using the aviation industry as a test bed. If the response to non-normal situations is similar to normal situations, it would be expected that participants with positive mood would commit fewer errors and complete the evacuation process of an aircraft quicker than individuals with a negative mood. If this holds true, a logical extension of this study is to investigate if the pre-flight safety briefing provided by airlines prior to each commercial flight can be used to positively influence passengers' mood. Lastly, if a reward system could motivate passengers to pay more attention to the safety information as an alternative method of mood manipulation. With this backdrop, the present study aimed to answer the following main research questions.

1. Does mood affect individuals' performance under non-normal situations such as an emergency evacuation from an aircraft?
2. Can individuals' mood be manipulated through a pre-flight safety briefing and if so, is there a relationship between mood and retention of information contained in the briefing?
3. Could a reward system enhance passengers' mood and motivate them to pay more attention to the pre-flight safety briefing and additionally, could a reward system influence passengers' memory to retain the safety information?

In order to answer these questions, three experiments were conducted hypothesising first, that participants in the positive mood manipulation condition would commit fewer errors and complete the evacuation quicker than participants in the negative mood manipulation condition. Second, it was hypothesised that employing humour or celebrities in a pre-flight safety briefings can positively affect individuals' mood as well as their ability to recall key safety messages presented in the briefing. Finally, it was hypothesised that a statement prior to the pre-flight safety demonstration, offering rewards for recalling safety messages, would improve passengers' mood and motivate them to pay more attention to the safety briefings.

Experiment one consisted of two stages. The first stage tested the efficacy of mood manipulation by comparing mood scores prior to and after mood manipulation. Stage two tested the effect of mood on individuals' performance by recording the number of errors during evacuation and also the time taken to complete the process. Experiment two tested whether the features of the pre-flight safety briefing would affect individuals' mood, and subsequently investigated participants' memory retention. Experiment three examined if a reward system could motivate passengers to pay attention to the safety information contained in the pre-flight briefing prior to the flight.

1.3. Summary

Aviation is a high-risk industry with heavy dependence on human performance. It can benefit from the relationship between mood and performance by utilising mood to enhance performance in unforeseen situations such as an emergency evacuation requiring rapid egress from an aircraft rapid egress from an aircraft. Many fatalities or serious injuries incurred in accidents and incidents could have been avoided if passengers had complied with the prescribed pre-flight safety briefing (Chang & Yang, 2011). Airlines are currently introducing innovative ideas to induce passengers to pay more attention to the pre-flight safety briefing. The intention is that passengers become more familiar with their responsibilities and the aircraft's features and are better prepared for events such as rapid cabin evacuations.

Mood is anticipated to be an effective tool which can be used to influence passengers' cognition. It is anticipated that by taking advantage of mood–performance congruence, heightening mood would mean that passengers would remember and be able to use safety instructions more effectively. Several studies have confirmed the direct relationship between mood and performance under routine conditions, and in relation to humour, stress and coping strategies. Nevertheless, no research literature suggests the existence of such a relationship under stressful conditions such as rapid evacuation from an aircraft. Therefore, the main aim of this study is to investigate the effect of mood on passengers' performance during a simulated non-normal condition (a cabin emergency evacuation) and, following mood manipulation, examine if passengers could recall the key safety messages from the pre-flight safety briefing, and specifically when those messages were embedded in humour or delivered in an entertaining mode. In addition, the study aimed to determine if a reward system could motivate passengers to pay more attention to the safety briefing than the mood manipulation strategy.

Chapter 2: Aircraft cabin safety

The aim of this chapter is to highlight the importance of aircraft cabin safety and discuss underlying factors that contribute to it in an emergency evacuation. With reference to various aviation examples, this chapter demonstrates the significance of aircraft cabin safety and underlines safety factors such as operational procedures, manufacturer safety obligations, crew skills and passenger training. In addition, this chapter examines the role of passengers' behaviour during emergency disembarkation.

The challenge of increased passenger movement and air transport density has been partially managed by producing ever-larger passenger aircraft such as the Airbus A380 and B747 super jumbos (Walker & Baker, 2008). Notwithstanding of the decision made by the Airbus to stop superjumbos' (A380) production, some airlines have only reduced their forthcoming fleet orders. For example, Emirates airline has reduced its A380 order from 162 to 123 aircraft which will take a few years to be removed completely from the market (Svensson, 2019). Several factors, such as fierce competition within the air transport industry, disputes over damage payments in the aftermath of accidents, and the public demand for greater safety and accountability have led aviation regulators to compel manufacturers to improve cabin designs and the airlines to enhance their operational procedures and training. According to Calder (2018), the rapid expansion of the air transport sector and the increase in passenger numbers, with the consequent demand for very large transport aircraft, is a challenging development within the civil aviation industry.

2.1. Very large transport aircraft

Emergency evacuation from Very Large Transport Aircraft (VLTA) poses a large responsibility on manufacturers as they have to assure the public of the structural integrity of their product and demonstrate that their aircraft is safe and flightworthy. More importantly, past rapid disembarkations during unpredicted events such as fire and fume or bomb threats could not be used as good lessons, because exiting from a very large aircraft when in panic, may necessitate application of different procedures due to aircraft's different structure (e.g. stairways). For example, jumping onto slides from an upper deck of a super jumbo (B747, A-380) approximately 8 metres above the ground, would be frightening for some passengers, and both the height and the fear require extra time to exit the aircraft. Reports from training organisations and airline operators indicate that as the exit height increases, passengers hesitate more and require more time to get ready to jump onto the slide (Muir & Thomas, 2004b).

New strategies and training are needed for the cabin crew to control and manage passengers. Estegassy and Koning (1999) believe that the cabin crew must be trained in the most effective way to overcome passengers' hesitation about jumping or manage passengers who want to sit instead of jump. Porter (2017) suggests that cabin crew need to be trained to deal with passengers who refuse to jump on to the slides by using methods including pushing, shouting and even kicking in order to unblock the exit path. Several credible aviation organisations, such as the FAA and the NTSB in the United States, the Japan Civil Aviation Bureau (JCAB) and CASA have conducted their own independent studies and confirmed that most problems during emergency evacuation relate to passenger behaviour, improper usage of communication equipment (i.e., the use of megaphones, public addressing and intercom) and difficulty of operating safety apparatus (Estegassy & Koning, 1999).

2.2. Passenger injury and cabin safety

The fatalities and serious injuries caused by the accident involving British Midland B737 Flight 92 at Kegworth in 1989 caused regulators to focus on passenger cabin safety (Safety Regulations Group, 1993). Subsequently, regulatory bodies such as the FAA required the aviation industry to place greater emphasis on passenger safety and aircraft cabin evacuation procedures during emergency situations (OTA, 1993).

The International Air Transport Association (IATA) asserts that aircraft cabin safety is a key component of an airline's safety management program, one which impacts on operational safety and requires proactive data collection and preventive activities regarding cabin design, operation, procedures, crew training, human performance and passenger management (IATA, 2013). IATA, through its cabin safety guidelines, highlights specific problems and provides guidance on issues such as passenger behaviour, handling dangerous goods, mitigating laser illumination in passenger cabin, inadvertent slide deployment and death on board. According to the IATA (2013), passengers and crew on long journeys, when crossing multiple time zones, experience disrupted sleeping patterns and eating schedules, which lead to fatigue and subsequently reduce their reaction time and motor skill, impair their judgement, reduce situation awareness, slow decision-making, and reduce motivation, vigilance and concentration.

According to Cherry (2009), many of the fatalities that have occurred in aircraft accidents due to equipment failure, inadequate crew skill or inadequate procedures could have been prevented. Cherry (2009) investigated 147 commercial aircraft accidents between September 1993 and October 2000, and found that 101 were survivable, while 70 involved fire with extended emergency evacuation; 50% of the evacuation completion times were within 130 seconds and 90% within 325 seconds. Based on accident investigation reports, Fiorino (2002) found that the source of many passenger injuries during rapid disembarkation was equipment failure. For example, in 2002, due to an engine fire on the left side, an emergency evacuation was conducted from the right side of a Boeing 747 aircraft; nine passengers were injured because only three of the five slides at the exit functioned correctly (i.e., the automatic feature failed). Fiorino (2002) states although the failure of the automatic features related to manufacturing defects, deficiencies in cabin crew training also contributed to the accident, as the crew did not know how to deploy the slides manually.

Aircraft equipment failure and their consequences have been raised with respect to several accidents in recent years. Emergency slides which have fail to open or become deflated during emergencies, can severely injure passengers (ATSB, 2003). Likewise, if cabin crew fail to recognise that the door is in manual mode on landing, according to Porter (2017), the inflatable slides can be activated within 10 seconds and impact staff on the outside the door, causing fatal or serious injuries (Figure 1).

Figure 1. Emergency slide deploys on the ground in an Alaska Airlines Boeing 737-400 (N778AS). Source: Aviation Safety Net (2014)

Passengers' awareness of the safety equipment and accessories carried on board the aircraft and their belief in its functionality is an important factor in passengers' confidence before and during an emergency. Normally, the inspection of the lifejackets is conducted before the first flight of the day or at an interval in accordance with the company's standard operating procedures (assuming that the lifejackets remain intact throughout the day). Nevertheless, it has been reported that some passengers, despite a hefty penalty, remove the lifejackets and take them home as souvenirs (Porter, 2017). Hence, passengers should be aware of those circumstances, and a few words should be included in the pre-flight safety briefing to verify that each passenger has a lifejacket.

As mentioned earlier in this thesis, in 1980 a TriStar jet liner (L-1011) from Saudi Arabia carrying 301 passengers and crew caught fire on the ground. All passengers and crew died due to the fire and smoke inhalation. An investigation into the accident found the crew's failure to initiate an emergency evacuation was the leading cause of the outcome (FAA, 1990). Similarly, in 1999, three of the 315 passengers on board a McDonnell Douglas MD-11 were killed and 208 injured during an emergency evacuation at the Hong Kong International Airport after the aircraft rolled over during landing and caught fire (CAD, 2004).

There are other instances in which passengers have survived accidents but suffered serious injuries. For example, in 2005, an Air France Airbus 340 crashed into a creek and caught fire after landing at Toronto International Airport. All of the crew and 309 passengers were able to evacuate the aircraft before the fire reached the aircraft exit doors. However, 12 people sustained serious injuries during evacuation (TSB, 2007). According to the TSB, the reasons for this included that the brace position commands were not given by the cabin crew during the emergency, there were no clear queues to the dual-lane slides, and more importantly, although all passengers evacuated the aircraft, the evacuation was impeded as nearly 50% of the passengers took their carry-on baggage with them – a behaviour that is condemned by airlines and authorities.

Communication between passengers and cabin crew at critical times, such as rapid evacuation from an aircraft, can be alarmingly poor. Passengers have reported in many cases that their safety comments were ignored by the cabin crew ,as it was assumed that passengers knew little about the aircraft and that the crew had the training, skills and knowledge to handle any abnormalities. For example, in 2018, terrified passengers stated that they were shocked when an emergency exit door fell off, nearly hitting several passengers, after a Dana Air 737 aircraft had landed at Abuja, Nigeria. Several people saw that the exit door handle was not latched properly during the flight and pointed this out to the cabin crew, who refused to accept that anything was wrong (Munachim & Bukola, 2018).

Insufficient transfer of safety-critical information or miscommunication between cabin crew and pilots has been identified as one of the major contributing factors to aircraft accidents in investigations to date. This occurs when, for example, passengers or cabin crew have some safety concerns and are reluctant to convey them to the technical crew – the pilots. Several accidents have highlighted cabin and flight deck's communication problem. In the Air Ontario accident during take-off from Dryden Airport, ice accumulation on the wings was observed by one crew member, flight attendant Sonia Hartwick, who testified that she was reluctant to transfer the information to the pilots as the management was not supportive of cabin crew raising concerns about operational matters. The same safety-critical information was also mentioned by a passenger, but the cabin crew failed to convey the information to the pilots because they were concerned about looking foolish (Chute & Wiener, 1996).

Unlike the fatal accidents that capture much of the media's attention, numerous accidents occur that are not catastrophic in terms of death or serious injuries, and emergency evacuations are executed successfully. For example, in 2007, China Airline Flight CI-120, a Boeing 737, caught fire shortly after landing at Naha Airport in Okinawa, Japan. Smoke was seen coming from one of the engines shortly after the aircraft came to a stop. All 157 passengers (including two infants) and eight crewmembers were able to evacuate the aircraft unharmed within 90 seconds, using slides (Chang & Yang, 2011). This and other successful evacuations can in part be attributed to changes in regulations introduced in the 1990s. Since 1990, manufacturers have been forced to look at passengers' emergency evacuation more critically due to regulations imposed by authorities such as the FAA (1990) and CASA (2009). For the purposes of certification, FAA and CASA require compliance with the 90 seconds rule (amongst other rules for emergency evacuation), which (as noted previously) specifies the maximum time allowable for all occupants to evacuate the aircraft and reach the ground under emergency conditions with only half of the emergency exits being utilised (CASA, 2009; FAA, 1990).

According to the Office of Technology Assessment (OTA) (1993), emergency evacuation simulations by aircraft manufacturers have to be conducted in a dark environment so that the aeroplane emergency lighting system can provide guidance to emergency exits and slides. Initial certification and compliance with the 90 seconds rule requires robust training, which accounts for many factors such as the aircraft's number of emergency exits, their size and location, seat and aisle arrangements, passengers' age, gender, passengers' social group relationship (i.e., bonds between family members and whether or not they are sitting together), health and mobility (Miyoshi et al., 2012). However, Miyoshi et al. noted that a simulated emergency evacuation to satisfy the 90 seconds rule is not necessarily a true reflection of a real event, as the certification test uses fit, young and healthy volunteers, and does not take account of the possible physical, mental and social factors that might be present in a real passenger complement.

In recent decades aviation has experienced remarkable progress and commercial air transport has improved tremendously since its introduction in 1950 (Muir & Thomas, 2004). Safety developments include improvements in the passenger cabin, for example, provision of additional space adjacent to the emergency exits, installation of floor lighting to guide the passengers towards emergency exits in the event of complete darkness, and introduction of smoke detectors in toilets and cargo compartments to detect smoke and fire almost instantly. However, Muir and Thomas argue that in order to improve the probability of a successful rapid disembarkation of everyone from the aircraft, the impact of passengers' behaviour under stressful conditions needs to be further scrutinised.

Chang and Yang (2011) write that cabin safety and rapid passenger evacuation, whether due to a real emergency situation or as computer-generated or full-scale practice, have three major common components: aircraft, crew and passengers. Chang and Yang claim that any changes in one of these components will affect the overall outcome of evacuation. The model presented by Chang and Yang does not take into account the dynamic nature of the emergency, for example, whether the rapid evacuation is because of a bomb threat or due to toxic fumes or smoke which can affect the passengers before disembarkation. Also, Chang and Yang did not consider the prescribed programs dictated by the aviation regulators and the subsequent procedures and training implemented by the airlines as the operators are sufficient. Chang and Yang rightly refer to the manufacturers being numerically oriented, and note that the numbers they use in their simulated evacuation methods to demonstrate their efficacy and compliance with regulators do not represent real-world psychological and behavioural diversity.

2.3. Passenger behaviour during emergency evacuation

Passenger behaviour has been studied by several scholars. For example, Liu, Wang, Huang, Li, and Yang (2014) state that passengers tend to scramble and rush to reach the emergency exits when they deem the situation is grievous. Liu et al. (2014) noted that 78% of all fatalities occur after the impact and 95.4% of the fatalities relate to slow and inefficient evacuation. Liu et al. further elaborate on some passengers' panicked behaviour, which can include climbing over the seats and fuelling conflict with others. These abnormal behaviours are important factors under emergency conditions, as individual behaviour affects the cohort's survival.

Miyoshi et al. (2012) scrutinised general characteristics of passenger movement and passenger behaviour during emergency situations using a computer simulation. First, they assumed that all passengers received the safety information provided by the airline and complied with instructions. Miyoshi et al. (2012) represented data, such as the locations and relative directions of the emergency exits and emergency exit signs (in a DC-10), as stored in each passenger's memory (see Figure 2). During the simulation, the computer model simulated the non-adaptive behaviour of frightened passengers using abnormal movements instead of shortest and fastest routes to the emergency exits. Miyoshi et al. devised the mathematical formula $St = k(Pn - 1)$, where St is simulation step, which would be unchanged when there is a traffic jam, Pn is the number of panicked passengers when the passage to the emergency exits are jammed, and k is the coefficient for passengers' behaviour, defined as the time delays caused by the jam in the queuing line to reach the nearest emergency exit. k increases as the moving speed in jam slows. The simulation showed that panicked passengers cause substantial delay during an emergency evacuation. Miyoshi et al. further noted that passengers in panic situations become selfish by not joining the queue or complying with public rules. They display ineffective behaviour such as getting in each other's way, and transmit their anxiety and selfishness to other passengers surrounding them. Therefore, anxiety and panic, lack of information and irrational passenger behaviour must be accounted for even during simulated emergency evacuations (Miyoshi et al., 2012).

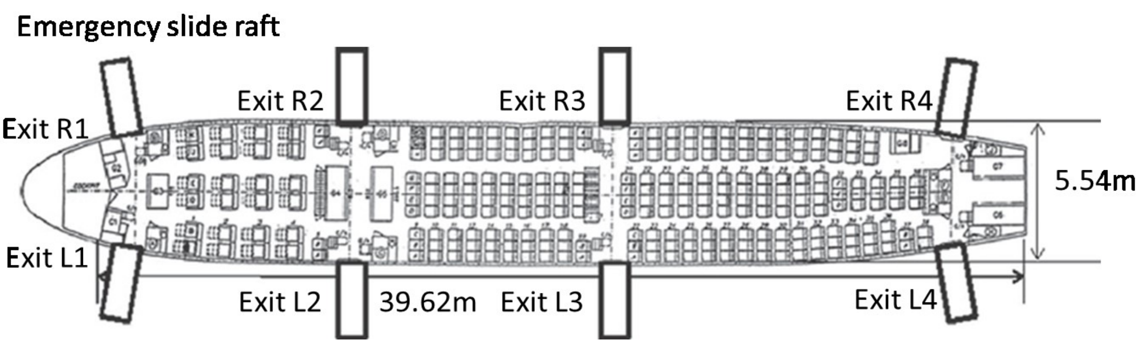

Figure 2. Cabin interior of DC-10.

Edwards (1990) performed a psychological analysis of passengers' behaviour. She claims that passengers' behaviour is subject to stress derived from the fear of death. She also argues that some passengers will behave in an orderly way and control their actions properly; this is why accidents with similar conditions can produce different fatal consequences. Edwards also refers to the level of the passengers' arousal (refer to Figure 3) which, if permitted to rise beyond the optimal level, can hinder their performance during emergency evacuation.

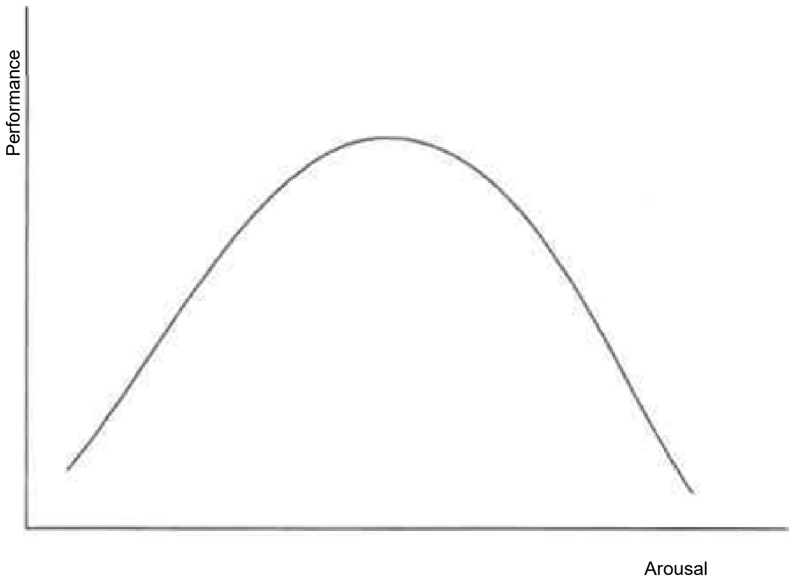

Figure 3. As arousal increases performance reaches the optimal level. Further increase in arousal result in deterioration of performance (Edwards, 1990. P. 2)

Although there is no unified consensus concerning the relationship between arousal and performance, some researchers believe that the curvilinear of these two properties (arousal and performance) has remained unchanged (Staal, 2004).

2.4. Accidents' similarities/dissimilarities

Muir and Thomas (2004) asserted that whilst no two accidents are the same, it is possible to learn from their similarities and differences and determine their causation. These may include environmental conditions, types of emergencies and the passengers' response. As an example, Muir and Thomas refer to the similarities between two accidents, one at Calgary in 1984 and the other in Manchester in 1985. Both accidents occurred in a similar aircraft type and were caused by engine fire during take-off; however, they differed significantly in terms of number of passenger fatalities. According to the Air Accident Investigation Branch (AAIB, 1985), the Manchester accident resulted in 55 fatal injuries, whereas none was experienced in the Calgary accident (Muir, Bottomley, & Marrison, 1996). In addition, Muir and Thomas found similarities between accidents in which all passengers work collaboratively towards one objective (i.e., attentive to the safety instructions they have received) and certification evacuations, which require evacuation the aircraft as quickly as possible. They suggested that the certification process should encompass circumstances similar to accidents in which passengers' psychological states and behaviour vary extensively, especially when the emergency involved smoke or fire, akin to the Hillsborough stadium disaster in 1989 (Taylor, 1990).

The hazard of fire by itself can be categorised into the three elements of heat, visibility and toxic gases. Zhang, Qi, Zhao, and Yang (2014) conducted a post-crash investigation and based on the reports from those accidents compared the Available Safe Egress Time (ASET) with the Required Safe Egress Time (RSET) and noted that survival is only possible if the ASET is above the RSET (refer to Figure 4).

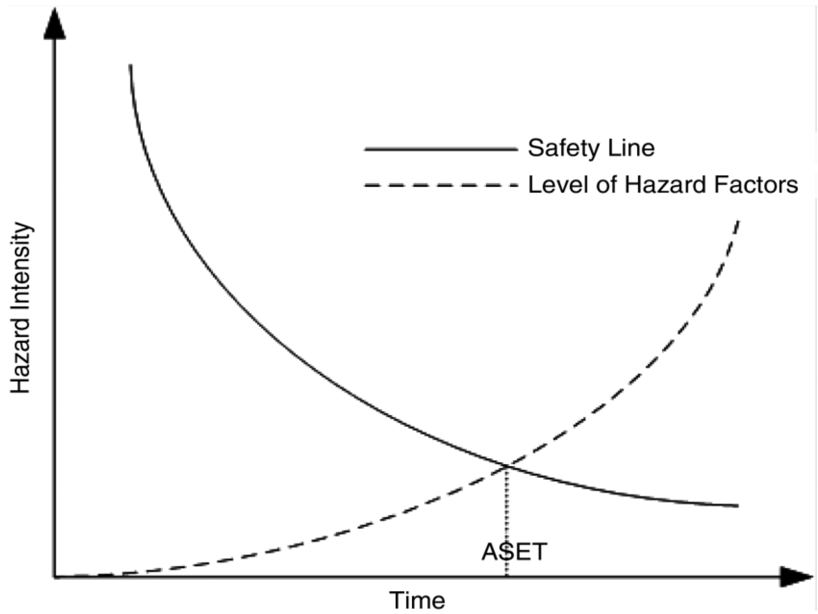

Figure 4. ASET is determined by using safety line and level of hazard factors (Zhang et al., 2014, p. 946).

In situations where a threat to life is imminent, passengers rather than being motivated to help each other, think about their own survival and in some cases only help their own family members (Muir & Thomas, 2004). Muir and Thomas argue that the individual instinct for survival supersedes the collaborative work needed to maximise survival for the entire group. In addition, passengers seated in the exit rows may not understand their obligation to use the emergency exit opening mechanism and their responsibility to help others exit the aircraft as quickly as possible (Chang & Liao, 2008).

Chang and Yang (2010) proposed four major categories and further 47 subgroups of passenger safety. These authors assert that passengers' survival depends primarily on aircraft design, which includes the aircraft's crashworthiness, occupants' restraints, access to emergency exits, fire and smoke suppression system, cabin lighting, exit flow rates and emergency slide effectiveness. The second most important factor is the flight and cabin crews' training and coordination, which determines how quickly and flawlessly they can communicate and attend to the emergency situation. Chang and Yang's third category is the team which handles post-crash operations, including airport personnel, firefighting services and the rescue team. Finally, Chang and Yang refer to the passenger behaviour and their safety education which is an essential component of survivability.

2.5. Passenger education

Chang and Yang (2010) note that passenger safety relates to safety education and passenger behaviour; the latter is dependent on passengers' mental conditions, mobility, obligations in critical times, language barriers, compliance with instructions and how much they remember of the safety information provided. Molesworth and Burgess (2012) studied the impact of noise in critical phases of flight (e.g. take-off) on the passengers' ability to hear and remember important safety-related information. Despite the airlines prohibiting regulations of using any Personal Electronic Devices (PED) during those phases, the result of their study indicated that passengers' hearing and safety information retention were enhanced when the signal to noise ratio was increased through the simple means of active noise-cancelling headphones (a PED device is banned by some airlines during take-off and landing).

Other studies of passengers' education on cabin safety exist. For example, Chang and Liao (2009) conducted research on the effect of safety education on passengers' cabin safety awareness based on the knowledge, attitudes and behaviour (KAB) concept. KAB holds that what individuals know can affect their attitudes, and their attitudes may influence their behaviour (Schrader & Lawless, 2004). Chang and Liao proclaim while KAB had not been examined for passenger education in safety in the past, it has a profound application consistent with other disciplines such as medicine or other areas of aviation. Chang and Liao found that aviation safety education increases passengers' cabin safety knowledge, thereby improving their attitude towards safety and consequently changing their behaviour.

Edwards (1990) asserts that the aim of passenger education is to reduce stress and panic caused by emergencies and allow the passengers to be prepared for an adverse event. Another advantage of passenger education is that the evacuation rules are less likely to be broken, as the passengers can understand the reasons for the rules and their consequences if not adhered to (Edwards, 1990). Edwards (1990) states that the airlines should explain the reasons behind the rules to the passengers – for example, why passengers should have their seat belts fastened at all times while seated, and why they should not smoke in the toilets. However, she notes the conflict between passenger safety education and airlines' short-term profitability, which means that commercial aviation may be reluctant to provide any more passenger education than the regulators require due to the extra time and cost involved (Edwards, 1990).

Edwards (1990) argues that if airlines take a more direct and systematic approach towards educating passengers about safety hazards and preparation for disasters, the passengers' expectation of a safe and enjoyable flight may be damaged and they could lose business to rival airlines that do not provide such information. Some scholars have even recommended a longer-term solution to passenger survivability, suggesting that passenger safety education has to become part of public education starting from primary school (Liao, 2014), at least in more developed countries where air travel is most common. This would normalise flight safety and increase passenger survivability during emergencies (Muir & Thomas, 2004). Chang and Liao (2008) also contend that teaching passenger safety information in primary school will make the public realise the importance of acting appropriately during emergency evacuations; their safety conscious will improve and passenger survivability will increase substantially.

Liao (2014), following the KAB theory that behavioural intention is an indicator of future behaviour, conducted research on primary schoolchildren and volunteered teachers to study the interrelationship between attitude and behavioural intention. The research involved an educational program, a pre-take off safety demonstration, presentation of a passenger cabin safety card, and an emergency evacuation scenario. The education program included the essential answers to the questions such as: 'why', 'what', 'when' and 'explained how safety information is related to passengers' survival. The process began when the passengers (schoolchildren and teachers) arrived at the check-in counter and continued until they boarded the aircraft. The education program included three modes of delivery – lecturing, showing a film, and face-to-face demonstration. The lecture and demonstration included items such as the correct way to wear lifejackets. The short film was a supplement to the lecture and presentation and reiterated the points explained earlier. The findings indicated that the children experienced a significant increase in positive attitudes about most of the safety aspects of the program.

The long-term solution of passenger safety education from early childhood recommended by Liao (2014) appears to have a profound application. Several scholars have addressed short-term issues of cabin safety and passenger survival. Cherry (2009) and Fiorino (2002) identify equipment failure, inadequate crew skill and poor operational procedure as the main threats to cabin safety. Miyoshi et al. (2012) perceive that passenger safety is dependent on robust training. Muir and Thomas (2004) refer to passengers' behaviour during emergency evacuation as crucial to their survival, while Chang and Yang (2010) identify passenger behaviour and training as the main underlying factors of emergency survivability, in line with findings about one of the most recent aviation accidents, as described in the following section - the Southwest Airline in USA.

2.6. Safety complacency

An airline's safety awareness and safety climate can degrade over time due to factors such as competition and the drive for savings and shortcuts, numerical orientation (i.e., how many passengers carried and how much revenue earned) disproportionate focus on profits, or management's complacency about routine operations ("we do it all the time and we know it all!"), and the lack of incidents or accidents. For example, Southwest Airlines (a low-cost domestic carrier in the United States) which had no fatal injuries since its establishment in 1971, was nearly bankrupted by one accident. In 2018 an engine compressor blade failure in flight caused a fatal injury and substantial damage to the aircraft (NTSB, 2018). According to the Jansen (2018), the airline suffered considerable revenue loss immediately after the accident. Zhao (2018) noted that the reputation of the airline was damaged further when a photo posted on social media revealed that some passengers did not know how to wear their oxygen masks (Figure 5).

Figure 5. Southwest passengers wearing oxygen masks incorrectly, April 17, 2018. Source: Bobby Laurie, via CNBC

2.7. Passenger survival

The NTSB investigated 21 accidents between 1962 and 1984, and concluded that passengers' risks of fatal or non-fatal injury and their chances of survival were primarily dependent on the degree of attention paid to the pre-flight safety demonstration. The next most important factors were their familiarity with the location and operation of emergency equipment (learned by reading the information on the safety card) and whether they were motivated thus, been prepared to act promptly during an emergency situation. In contrast, some passengers who are not prepared for an emergency act contrary to the cabin crew's instructions (Muir & Thomas, 2004).

Passenger's behaviour and the way they could be managed has concerned the aviation community and despite some accidents which had no fatal or serious injuries, passenger control during and after an emergency has become an important issue. In 2018, after a Bravo Airways flight from Antalya, Turkey crash-landed in Kiev, passengers disobeyed flight attendants' instructions to remain seated; they rushed to the emergency exits and opened the doors (Stewart, 2018). Passengers' disobedience has been noted in several recent post-accident investigations. In 2016, an American Airlines B767 suffered an engine fire after landing at O'Hare International Airport, Chicago; passengers climbed over the seats and forced the cabin crew to open the emergency exit doors and evacuate the aircraft while the engine was still running. Cabin crew who were trying to contact the pilots to tell them to shut down the running engine and simultaneously insisting passengers remain seated, reluctantly deployed the emergency slides without any coordination with the pilots. Some passengers reportedly suffered injuries from the jet blast of the operating engine when they reached the bottom of the slide. Moreover, despite clear instructions from cabin crew about leaving personal belongings behind, some passengers carried their bags with them during evacuation ("NTSB report: Passengers pressured flight crew", 2017). Passengers' refusal to cooperate with aircrew and follow emergency instructions has now been recognised as a threat to air travellers' safety by the experts and aviation regulators such as the FAA and NTSB.

As a direct reaction to the casualties from the 2016 American Airlines accident – one passenger was seriously injured and 20 other passengers suffered minor injuries (Associated Press, 2017)– the NTSB recommended that the FAA conduct research to evaluate the risks of passengers taking carry-on baggage while disembarking from an aircraft during an emergency. NTSB has requested a mandate while addressing the countermeasure procedures to apply heavy fines of up to USD250,000 for passengers who interfere with crewmembers' ability to perform duties (Clarke, 2018).

It should be noted that fining or penalising passengers does not directly address passengers' behaviour and prevent them from carrying their bags or challenging cabin crews' instructions during a rapid disembarkation from an aircraft. Passengers' cognitive behaviour as a critical factor has been highlighted by accident investigators during emergency evacuations with post-accident reports record a wide range of inappropriate behaviours, ranging from panic, helplessness and dependency to becoming frozen and immobile. There are also reports that show that people who behave in a competent and orderly way minimise their risk of injury (Edwards, 1990). In order to deter inappropriate behaviour, it must be understood how people react in stressful situations such as an emergency disembarkation from an aircraft prior to a flight or after landing. The emergency or rapid disembarkation can be due to smoke/fume or fire in the cabin. Furthermore, toxic fume and smoke reduce visibility and hinder communication, which exacerbate passengers' anxiety and nervousness. In addition, Edwards (1990) believes that stress can be associated with biological outcomes such as high heart rate and sweating, flow of blood from digestive tract to the extremes that may manifest as fear or anger, in which prepare the individuals for inappropriate behaviour.

Bricker (2005) has dissected air travel stress into three components: anxious reactions to adverse inflight events, angry reactions to other passengers as well as preceding of the flight, and lack of trust in the airline or the management who try to assure the passengers of their safety. The air travel environment potentially includes multiple unfavourable events or circumstances which could provoke anxious and angry reactions from passengers. These may include long queues to check in, security checks and body searches, flight delays or cancellations, and other events such as rude behaviour from fellow passengers. However, the psychological factors of air travel stress and the characteristics of those who are stressed have to be determined before any treatment or preventive action can be recommended. As part of determining flight's psychological factors, Bricker (2005) used two different constructs: a model in which air travel anxiety and anger are two separate factors, and a model reflecting anxiety and anger as a single factor, as proposed by Watson and Clark, (1984). Watson and

Clark claim that anxiety and anger are the result of emotional stress and are directly related to negative mood.

2.8. Summary

Increased air travel and the use of ever-larger aircraft have forced airlines, along with the regulations imposed by government bodies such as the FAA and CASA, to focus on passenger safety and include strategies such as the 90 seconds rule to ensure passengers can safely disembark during emergency evacuations. This chapter outlined the importance of aircraft cabin safety and its contributing factors such as operational procedures, crew and passenger training requirements. Furthermore, this chapter highlighted the need to manage passengers' behaviour during an emergency evacuation. The following chapter elaborates on mood constructs and explains how mood, as a driving mechanism of behaviour, can be manipulated in order to affect performance.

Chapter 3: Mood

This chapter defines mood, its constructs and outcomes. This chapter specifically differentiates mood from other emotional states. It also examines how mood can be manipulated. The chapter reveals the inconsistency of scientific opinion on the formulation of mood, particularly with regard to its duration and severity, but demonstrates that most studies support the concept of mood as a durable feeling state, which, by its manipulation, can enhance performance. This chapter also discusses the effects of various mood manipulating methods such as colour, film and temperature.

3.1. Mood and emotion

Mood is sometimes referred to as a relatively enduring negative or positive emotional state (Nettle & Bateson, 2012), while Apter et al. (1997) define it as a rapidly fluctuating state which can be measured specifically by its affects such as fear or happiness, anxiety, fatigue or arousal. According to Beedie, Terry, and Lane (2005), mood is an intangible long-term state of mind with low intensity; more simply, it is about feeling 'good' or 'bad'. In general, mood is a background feeling state which is largely unrelated to a specific cause. It is at this level that mood differs from emotion (although the terms are often used interchangeably); emotions can affect mood, but are linked to an identifiable source (Ekman, 1992). Beedie et al. found that it is easier to control and modify mood, and unlike emotions it can be hidden from other people. The consensus among some academics related to a definition is that mood is capable of altering cognitive and behavioural responses to a wide range of objects and events (Morris, 1989).

Sakuragi and Sugiyama (2011) state that mood is specific to a given situation and can be measured for a prolonged period, in some cases as long as several months. In contrast, Lane and Terry (2000) define mood as a set of feelings, temporary in nature with varying intensity and duration, which usually involves more than one emotion. Hence, in their view mood can be regarded as a mechanism which can evaluate feelings, perceived as pleasant or unpleasant and enduring for an unspecified time (i.e., short or prolonged duration).

No consensus exists about the definition of mood. According to Lane and Terry (2000), it is essential for researchers to establish a more formalised definition of mood because the diversity of current definitions produces inconsistent conclusions about the relationship between mood and performance.

Lane and Terry (2000) state that whilst mood and emotion are part of the same conceptual framework, they cannot always be distinguished; although they define mood as an apparatus for evaluating feelings, they add a layer of uncertainty to their definition by introducing the term ‘affect’. Lane and Terry argue that affect varies in duration and intensity and exhibits feeling states changing from negative to positive. Beedie et al. (2005) also support Lane and Terry and assert that the distinction between mood and emotion is often difficult. For example, they refer to ‘anxiety’, as a product of mood, irrespective of its duration, whether it is the result of short duration such as ‘how do you feel right now’ or enduring feelings of ‘how have you been this week’. However, Beedie, Terry, Lane, and Devonport (2011) assessed the two emotional states, using a questionnaire model based on emotion-mood distinctions and found that emotion and mood can be distinguished empirically in line with theoretical predictions when contextual information is used to distinguish between the two states. They used the students’ thesis as their experimental variable and found students preparing to submit a thesis had significantly higher scores of anxious emotion than anxious mood about their thesis.

Unlike Russell (2003) who combined emotional states, Beedie et al. (2005) analysed 65 articles in the fields of psychology, psychiatry and philosophy, and found that mood and emotion could be measured as distinct constructs. They identified eight distinguishing themes between the two. These included by: duration, intentionality, cause, consequences, functionality, intensity, physiology and awareness of the cause. However, most articles (59%) cited just two or three distinctions between mood and emotion, and more notably, most researchers agreed that based on an individual's strength, emotion is more about spontaneous reactions or feelings, while mood is controlled by the brain and is normally the result of a cumulative sequence of events. In line with their theoretical predictions, Beedie et al. (2005) argue that emotion and mood can be distinguished empirically based largely on duration.

The rationale for pursuing distinctions between mood and emotion is as follows. First, clarity of terms is vital for scientific research; confusion can result in ambiguous findings. For example, from a therapeutic perspective, anxious emotion can be differentiated from anxious mood, and different course of actions may be required to treat their causes and consequences (Beedie et al., 2005). Beedie et al. argue that if the anxiety and surgency (emotional reactivity for high positive affect) of emotional state is different from anxious mood state, then their causes of the two states may become sensitive to different therapeutic treatment. Hence, different strategies may be needed to control the consequences. According to Ekman (1992), emotions may have specific causes, which moods do not. Therefore, an effective strategy to regulate emotion varies from strategies which regulate mood.

Thayer (1989) asserts that whilst emotional reactions may be over in minutes, mood can take hours, days or even months to improve if the individual is seriously depressed. Thayer states "emotions are often identifiable but moods may come and go strangely with no obvious reasons" (p. 294). Although some researchers have assumed that mood is caused by normal life events, Thayer (1989) found that mood can be the result of several factors. He suggests that mood is strongly influenced by biological conditions such as stress, health, nutrition, sleep or even time of day. Thayer notes that mood is cyclical, and can relate to differences between day and night (circadian rhythms), stages of the menstrual cycle, and time of year (as in seasonal affective disorder). He also notes that mood can be measured both physically and psychologically. According to Thayer (1989), the relationship between mood and physical and psychological fitness is well established; mood can influence perception, memory, judgement, decision-making, self-regulation and behaviour.

3.2. Mood structure

Several attempts have been made to describe the structure of mood. Watson and Tellegen (1985) claim that mood has two dimensions, pleasantness and unpleasantness (happy, enthusiastic and content vs. afraid, upset and sad) and degrees of arousal or activation (excited, astonished tense vs. relaxed sleepy). Watson and Tellegen created a schematic representing the relationships of basic mood states (Figure 6). It depicts the terms and their correlations to one another; for example, words that are located within the same octant have a highly positive correlation, whereas words with 90-degree separation have moderate positive correlation and words 180 degrees apart are opposite in meaning and negatively correlated.

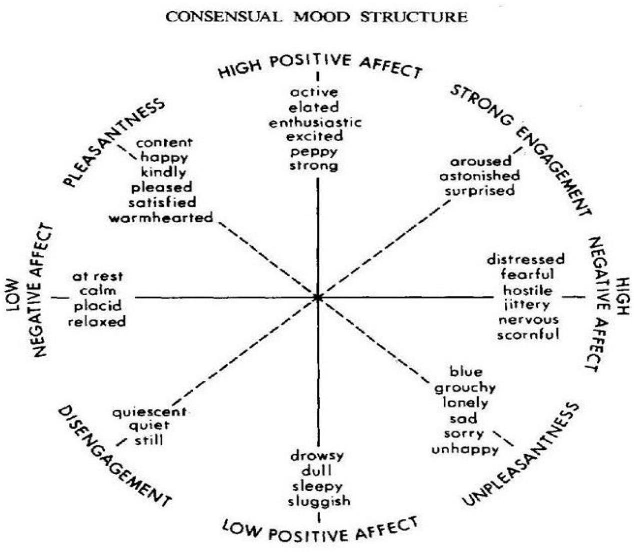

Figure 6. Mood structure (Watson & Tellegen, 1985, p. 221).

Russell (2003) attempts to simplify the structure of mood; he combines mood and emotions by inserting another layer of terminology, ‘core affect’, to describe the feeling. He believes that the ultimate feeling, which is at the heart of emotion and mood or any other emotionally charged event within the core affect, is either good or bad. In other words, core affect describes mood but at the same time encompasses all other unnoticed emotional state events. Russell (2003) expands on emotional states and refers to core affect as a neurophysiological state, which is a raw feeling present in both emotion and mood and continuously providing information on the pleasure or displeasure and arousal value of stimuli in the brain (see Figure 7). According to Russell, a person always has a feeling which is included in core affect. Imagine a single point at the centre of Figure 7 – a neutral point, or at a peripheral spot – moderate or extreme, responding to the surrounding internal and external events. Russell believes core affect can be short-lived or long lasting, and when it becomes intense can be the focus of consciousness but it dissipates from the conscious when it is at the centre and stable. According to Lang (1995), core affect can influence behaviour ranging from reflexes to complex decision-making.

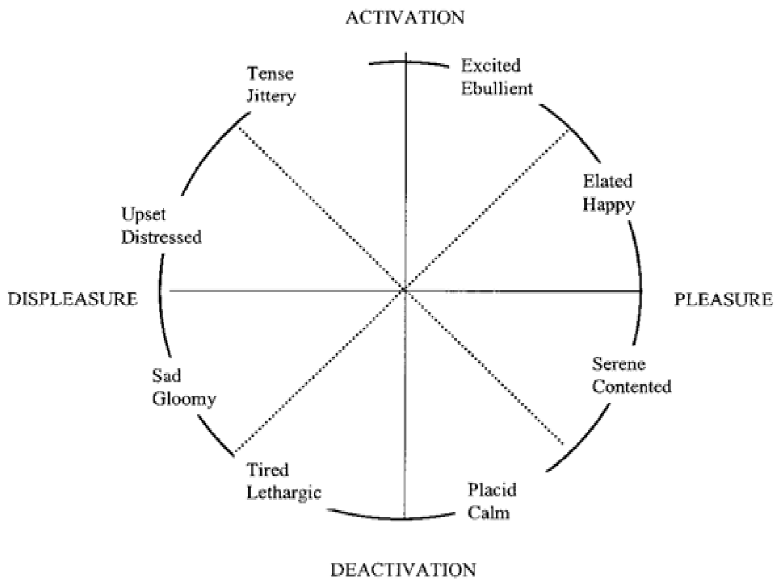

Figure 7. Core Affect (Russell, 2003, p. 148).

Core affect is often used interchangeably with other feeling states such as activation (Thayer, 1989), mood (Morris, 1989) and affect (Watson & Tellegen, 1985). However, Russell (2003) believes that in psychology, core affect is the simplest level of expressing feelings. Another explanation of core affect in contrast to mood is provided by Yik, Russell, and Steiger (2011). According to Yik et al., whereas mood implies a prolonged experience, often relatively mild in terms of behavioural conduct, thoughts and motivation, core affect is only a segment of mood or a single feeling at a slice in time, and is relatively intense in terms of thoughts and motivation. Therefore, while a person could be in a mood state (i.e., not positive or negative), a person always has core affect and is potentially accessible. Hence, people can always tell how they feel whenever they are asked.

3.3. The relationship between mood and performance

Research interest in the correlation between mood and performance has increased notably in recent years as mood has become recognised as a core element of human behaviour and mood management as central to daily activities (Thayer, Newman, & McClain, 1994). Pictet, Coughtrey, Mathews, and Holmes (2011) used pictures and word cues to show the effect of generating mental imagery on mood and subsequently performance. According to Barsade and Gibson (2007), the effect of mood on performance is manifested through employer's interest in workers' performance and in particular methods of organisational outcomes such as productivity, performance, decision-making, creativity, turnover, personnel's behaviour, teamwork, communications and leadership. Barsade and Gibson also underline the significance of positive emotional state, which is directly associated with higher income, enhanced negotiation ability and performing discretionary acts in support of organisational goals and objectives. For example, Sharma and Levy (2003) found salespeople's general positive feeling towards customers was persuasive and could significantly influence sales performance.

Kavanagh and Bower (1985) examined the effect of happy and sad moods on efficacy judgements in relation to different activities. Kavanagh and Bower argue that reduced self-efficacy due to depressed mood is likely to depress mood even further. This could lead depressed people to withdraw from challenging activities, expending less effort and persisting for shorter durations on the tasks they attempt (Bandura, Reese, & Adams, 1982). These proposed effects of low mood have obvious implications for emergency evacuation situations, potentially exposing depressed people to high injury risk.

3.4. Cultural differences and mood

The effect of mood on performance cannot be assessed accurately without considering issues associated with cultural diversity. Air travellers, especially international passengers, are often from different ethnic and cultural backgrounds and not all can speak English (Helmreich, & Merritt, 2016), the international language of aviation. Yeun and Shin-Park (2006) found that measuring mood states across diverse cultures is essential to understand the universal aspects of mood and its structure when designing treatment strategies.

Whilst several scholars refer to the duration of emotional states to differentiate between mood and emotion, a few believe the distinction between the two states becomes multifaceted when mixed with cultures. For example, Eid and Diener (2001) found that different cultures express their feelings in different ways. Through research, they noticed that participants' responses in terms of articulating their moods varied to several one-item questions. For example, nationals from the United States, Australia and Taiwan considered anger, fear, sadness and guilt as undesirable and inappropriate feelings, while the Chinese thought those negative emotional states were desirable. Eid and Diener argue that their results make the classification of feelings meaningless when different cultures are involved. Russell (2003) agrees with the declassification of feelings and believes not everyone uses the same categories.

Eid and Diener elaborate on the relationship between mood and culture by referring to some cultures which prescribe how people should feel in specific events (i.e., on wedding day or at a funeral). According to Eid and Diener, cultures which value positive emotional states encourage people to seek situations which provoke positive feelings. In contrast, cultures which have little regard for positive feelings may cultivate situations in which people think positive mood is inappropriate. These cultures are likely to encourage people to withdraw from positive situations and even try to dampen positive feeling (Eid & Diener, 2001). A clash of cultures in respect to emotional states during an evacuation can induce discord and endanger the safety of the aircraft and its occupants.

3.5. Mood scales

The use of self-reports of current mood state has become customary in research into normal mood variations. These reports are generally presented through tools such as the Profile of Mood State (POMS) or other well-known adjective checklists, for example, Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). According to Thayer

(1989), these ratings with different psychological functions can be used to predict behaviours, and used to manipulate mood and study the consequences. POMS has been extensively as a measure of mood states and mood changes in psychiatric populations has been extensively documented (Thayer, 1989; Baker, Hassmen, & Blomstrand, 1991; Renger, 1993; Baker, Denniston, Zabora, Poland & Dudley, 2002; Denniston, Bourgeois, LeUnes & Mayers, 2010).

Mood manipulating tools may include audio-visual materials (pictures, films and music), exercise, drugs or even hypnosis (Thayer, 1989). Forgas (1998a) manipulated the mood of 96 library students, eliciting positive and negative moods by showing selected mood induction images. The mood induction pictures selected were from a larger sample of 31 images as the most consistently rated as stimulating positive and negative mood on a 7 point bipolar scale by a pilot sample of 26 students. Then, students were asked to elaborate on those images and complete a questionnaire. As part of the post-mood-manipulation episode, students were approached by nominated colleagues with a request for some writing papers. The phrases they used to demand paper were either polite, such as ‘excuse me could you please give me some paper to finish my assignment’, or discourteous, for example, ‘give me one sheet of paper’. The study showed that participants exposed to the negative mood manipulation were less likely to provide paper than those exposed to the positive mood manipulation.

The validity and reliabilities of these scales have been verified in various applications. For example, Terry, Lane, and Fogarty (2003) validated a 24-item, six-factor model using both independent and multiple sample analyses; the relationship between POMS scores and previously validated measures were consistent with their theoretical expectations. PANAS is another reliable measure, as demonstrated by Watson et al. (1988). They selected 10 terms for positive affect (PA) and 10 for negative affect (NA) out from an initial set of 60 terms to ensure that the terms had maximum loading on one factor and minimum on the other. PANAS was used across a large timeline: moment (feeling at the present moment), today (feeling today), past few days (felt this way within the past few days), week (feeling during the past week), past few weeks (feeling during the past few weeks), year (feeling during the past year) and general (general feeling this way on average). Other scales, for example, PA and NA which have been constructed on an ad hoc basis with no supporting validity and reliability (Watson et al., 1988).

3.6. Mood regulation

Researchers have utilised various procedures to alter moods and have assessed individuals' cognitive reactivity in order to determine their effectiveness (Does, 2002). Does (2002) used music and film as mood-induction modes in an examination of dysfunctional cognition in depressive individuals. Participants underwent two types of sad themes by focusing on a sad memory hence, while one group listened to sad music, the other watched a fragment from the movie *The Champ*, which had previously been found to induce sadness. Does found that cognitive reactivity was much higher in vulnerable (depressed) individuals who listened to music than in those exposed to the film. Although, this occurred during both practices of listening to music and watching movies, the effect of music induction was greater as by listening to music and the correlation between mood and cognitive reactivity was significantly higher. He concluded that although the effects of both, music and film were largely similar, musical induction was much more effective, particularly for depressive individuals.

Other researchers have studied the effect on mood of environmental and ambient factors containing temperature, noise, music and lighting, design factors consisting of colour pattern and architectural layout, and social factors including service providers and customers (Yildirim, Akalin-Baskaya, & Hidayetoglu, 2007; Moon, Kim, Lee, & Kim, 2014; Sakuragi & Sugiyama, 2011; Stone & English, 1998). Yildirim et al. (2007) evaluated the effect of colour on customers' perception of atmospheric attributes (Table 1). The study was conducted in a café; the researchers changed the wall colours while the furniture and decorations remained the same. Results showed that the violet colour of the interior walls was perceived as more attractive than yellow. Furthermore, younger participants had more desire towards atmospheric attributes of the store, including the interior colours, than older participants. In addition, the male participants perceived the café more positively (e.g. spacious) than female participants. Like Stone (2003), who manipulated environmental colour and view to determine their effects on mood, motivation and performance, Yildirim et al. (2007) concluded that atmospheric attributes can influence feeling, emotion and mood.

Table 1. Means, SD and *t* values of dependent variables (Yildirim, Akalin-Baskayab & Hidayetogluc, 2007, p. 3236).

Means, SD and t-values of the dependent variables

Dependent variables	Colours of walls in store		Age of customer		Gender of customer	
	Yellow Mean[a] (SD)	Violet Mean (SD) t-value[b]	Younger Mean (SD)	Older Mean (SD) t-value	Male Mean (SD)	Female Mean (SD) t-value
Roomy/cramped	2.31 (1.03)	1.76 (0.86) 33.5*	1.85 (0.92)	2.19 (1.02) 40.2*	2.02 (0.97)	2.04 (1.04) 36.1*
High/low	2.44 (0.96)	2.32 (0.97) 30.1*	2.43 (0.96)	2.33 (0.97) 40.1*	2.23 (0.96)	2.52 (0.92) 37.5*
Pleasant/unpleasant	2.25 (0.93)	1.84 (0.92) 32.2*	2.00 (0.95)	2.08 (0.95) 38.7*	1.92 (0.92)	2.15 (0.96) 34.9*
Attractive/unattractive	2.13 (0.97)	1.92 (1.01) 28.7*	1.83 (1.00)	2.19 (0.97) 40.6*	1.77 (0.90)	2.26 (1.02) 31.2*
Interesting/boring	2.62 (0.94)	1.76 (0.95) 38.2*	1.96 (0.97)	2.38 (1.05) 42.3*	2.02 (1.00)	2.34 (1.05) 33.6*
Imposing/poor-looking	2.67 (1.04)	2.32 (1.01) 32.2*	2.56 (0.87)	2.43 (1.17) 39.1*	2.47 (1.02)	2.50 (1.06) 46.8*
Calm/restless	2.32 (0.99)	2.16 (0.92) 30.1*	2.32 (0.93)	2.17 (0.97) 38.1*	2.36 (0.91)	2.12 (0.99) 42.7*
Warm/cold	2.24 (0.96)	2.50 (1.11) 25.8*	2.32 (1.04)	2.41 (1.05) 40.2*	2.16 (1.02)	2.57 (1.03) 34.7*

Notes: SD ¼ Standard deviation. * 0.001 is the level of significance.
[a]Variable means ranged from 1to 5, with higher numbers representing more negative responses.
[b]t-Values: It is result of comparison of store atmospheric attributes with colour, age and gender variables.

Sakuragi and Sugiyama (2011) also conducted a colour–mood study, using partition board colours of red, yellow and blue to represent calmness and relaxation. They administered a video game which required high levels of concentration. It was anticipated that the partitions with different colours would have some effects on mood and nervous system and ultimately affect concentration resulting in a change of mood state. They used the POMS to assess participants' mood, finding that the blue partition board reduced task-induced fatigue, partly by lowering oppressive feeling of being enclosed while conducting the task.

Moon et al. (2014) took the colour study even further by investigating the interrelationship between mood, colour and music. They collected data about moods induced by music and the colours associated with different mood words, and using a two-way analysis of variance (ANOVA) analysed them to determine if the mood and colour distributions induced by the music depended on the listeners' musical preference. Moon et al. note that a feeling induced by listening to particular music can be enhanced by matching the colour of the environment to the feeling induced by that music. However, the limiting factor in their study was the fact that people have different musical tastes which could depend on their culture, age or gender. Moon et al. did not accommodate cultural diversity, age and gender differences in their study, factors associated with different musical tastes. Gender dissimilarities, for example, are noted by Bhui and Fletcher (2000), who found that physical activity of long duration confers protection against anxiety states for males, but not for females.

Szabo (2017) examined the level of participant anxiety and compared the effects of humour and exercise on mood. Thirty-nine university students were tested under three conditions of running, watching comedy videos and watching documentary films. The results illustrated that both humour and exercise reduced psychological distress and increased well-being; however, humour lowered anxiety more than exercise. Based on these results, Szabo concluded that humour can induce positive psychological affect that is at least compatible with physical exercise.

3.7. Summary

Mood is defined as an enduring emotional state with less intensity than emotion and no specific cause. Mood could be the result of multiple factors accumulating over hours, days or months, with no obvious reason, whilst emotions are short-lived and can be over in minutes. Mood can be produced by emotions and perceived as pleasant or unpleasant feelings. The factors underlying the mood construct include aggression, anxiety, surgency, concentration, fatigue and social affection, all of which relate to its endurance and relative stability. Mood is influenced by biological conditions such as health, nutrition, sleep and stress, and even by the time of the day or night, the month or the season. Mood is believed to have three dimensions, one with pleasantness and unpleasantness, covering (happiness, enthusiasm, content vs. fright upset and sadness), the degree of its arousal and activation which covers tension and excitements or sleepiness and relaxation and attention-rejection covering dominance and control (Watson & Tellegen, 1985). However, Watson and Tellegen, believe that the third dimension comprising aggression or attention-rejection is insignificant when compared with the other pleasantness/unpleasantness and arousal/activation.

Mood as a driving mechanism for human behaviour, when positively manipulated influences performance and consequently affect the organisational objectives with respect to decision-making, creativity, teamwork and communication. It is known that factors such as temperature, noise, design features, lighting music and entertainment can be used in mood manipulation strategies. However, the effectiveness of each manipulating mode may depend on a range of other factors including age, gender, culture and mental state.

Chapter 4: Mood and Performance

This chapter examines the interrelationship between mood and performance. It also examines the consequences of mood on work-related operations, in terms of job performance and error rate, in such aspects as teamwork, decision-making processes, creativity, leadership negotiation and turnover. This chapter also elaborates on mood as a performance indicator. This chapter shows that most scholars agree that mood and performance are related.

The functionality of mood has been widely debated in general psychology (Morris, 1989; Szabo, 2017; Harris, 1984; Usherwood, & Harris, 2014; Lane et al., 2001). Lane et al. contend that mood can influence cognition and can drive behaviour. They further note that depressed mood or unhappiness can lead to increased anger, confusion, fatigue and tension, and ultimately can hinder physical performance. Similarly, Totterdell (1999) found that star sportspeople experience troughs and peaks which could be explained partly by changes in mood.

It is generally accepted that mood is quite complex, driven by underlying factors such as aggression, anxiety, personality, concentration, fatigue and social affection, which impart in its structure (Hendrick & Lilly, 1970). Mood can take the form of general positive, pleasant, negative, or unpleasant feelings, and tends not to be focused on a specific cause (Lane & Terry, 2000). As noted in previous chapters, mood as a behavioural mechanism, is a long-lasting, stable emotional state, and is less likely to be triggered instantaneously by a particular event or stimulus (Newton, 2013).

It is widely believed that employees' mood, emotions and overall disposition are brought to work, which can influence their performance. This view has been supported by Knowlege@Wharton (2007), which refers to how emotions are important, as people are not emotionally isolated. Barsade and Gibson (2007) state that employees' moods, emotions, and overall dispositions affect job performance, decision-making, creativity, turnover, teamwork, negotiations and leadership. They argue that feeling is inherent to human experience, and therefore inherent to any situation in which humans interact with other people and their environment, including at work. Although there is little research literature that compares the influence of positive emotional states, such as happiness or elation, with that of negative mood and sadness on human cognition, the correlation between emotional states and job performance may be explained by focusing on some factors including clinical psychology on stress, depression, anxiety, pain or vulnerability factors to emotional disorders (Pourtois, Vanlessen, Bakic, & Paul, 2017).

4.1. Work attention

One of the key elements for successful completion of a task is the correlation between mood and performance, which can be related to the amount of attention required for a task. For example, employees' attention to their job description is not only one of the key determinants of organisational profitability and success, but a gateway to individuals' future improvement and prosperity. According to Jalal (2016), employees' performance is purely related to their productivity and efficiency which can be interpreted as the amount of time they spend on a task and their mental readiness. Mental readiness is an instilled mindset with well-developed procedures intended to utilise optimum performance to complete a task (Ievleva & Terry, 2008). Ievleva and Terry write that some employees use self-regulation strategies such as relaxation and /or energising techniques to manage their activation level, critical moments, cope with performance errors and manage mood as part of enhancing their mental readiness.

Likewise, mood at work and its spontaneity relationship to successful completion of a task has been studied. George and Brief (1992) define ‘spontaneous’ as referring to a behavioural pattern that is essential to organisational function and organisational behaviour in order to attract and hold people within its system. Mood at work is a pivotal construct for organisational success (George & Brief, 1992). George and Brief elaborate on the phrase ‘organisational spontaneity’ and its corresponding features, which are helping co-workers, protecting the organisation through safe conduct (for example, by reporting fire hazards or security matters), making constructive suggestions, self-development (seeking to enhance knowledge, skills and abilities required to perform more efficiently) and spreading word-of-mouth about the high quality of the organisation’s products.

According to George and Brief (1992), positive mood at work is a direct precursor of organisational spontaneity. George and Brief assert that whilst mood does not noticeably interrupt cognitive processes and behaviour, it influences them. Given the peculiarity of mood and the fact that we are mostly unaware of its effects, this influence could be significant. Leventhal and Tomarken (1986) noted that moods and feelings have powerful effects on thought processes, attitudes and behaviours in organisational settings. For example, positive mood at work not only affects individuals’ behaviour, it influences that of others – spontaneously.

Tellegen (1985) referred to mood’s positive and negative features as ‘high positive mood’ – denoting pleasurable or positive engagement, describable by adjectives such as active, elated, enthusiastic, excited and peppy – whereas ‘low positive mood’ implies terms such as drowsy, dull, sleep and sluggish. Likewise, ‘high negative mood’ encompasses states of unpleasant engagement, represented by terms such as distressed, fearful, hostile, jittery and nervous, while ‘low negative mood’ refers to states such as calmness, feeling at rest, placidity and relaxedness (Tellegen, 1985; Watson et al., 1988; Watson & Tellegen, 1985).

4.2. Regulating emotional states

Mauss, Bunge, and Gross (2007) addressed pivotal questions such as how people effectively regulate their emotions. Although most researchers believe that people can control their emotions by focusing on deliberate forms (self-control), Mauss et al., argue that, depending on the situation, this may be automatic (impulsive, unconscious) and as part of everyday life routinely regulated (through automatic emotion regulation – AER), with far-reaching consequences for individuals. Mauss et al. further state that because it is very difficult to accurately measure AER, evidence from neuroscientific studies should be used primarily in assessment. In response to the question ‘what is the significance of AER?’, Mauss et al. state that AER is directly related to overlearned habits, techniques and strategies (predominantly learned during childhood), sociocultural norms and implicit hedonic goals. Furthermore, Mauss et al., (2007) noted that AER consequences are mostly in the form of emotion regulation rather than emotional reactivity. The distinction between the two processes is important, because emotional reactivity may be much less malleable, due to its sociocultural factors, than emotional regulation. Recognition of different types of AER helps to understand the types of defences. For example, Shaver and Mikulincer (2007) explain how some people with avoidance strategies (i.e., individuals who usually avoid close emotional relationships) might have learned in childhood that expressing negative emotions is ineffective or counterproductive, and the strategies become automatic over time. Those avoidant individuals exhibit relatively moderate emotional reactions in their automatic response when they are assigned to a task (Shaver & Mikulincer, 2007).

4.3. Mood and trust

The impacts of mood on trust in individuals and intergroup interactions have been studied by some scholars attempting to explain how affect influences trust development and social judgement. Lount (2010) examined the effects of positive mood on people's tendencies to trust or distrust others. Lount found that the relationship between mood and trust is more complex than the mood–congruency model predicts. Specifically, people in a positive mood will trust others if the cues about the other party promote trust, otherwise, regardless of their positive mood, they distrust others. In addition to explaining the influence of mood on social judgement, Lount (2010) presents a useful framework, the accommodation–assimilation model, for better understanding of the effect of mood on cooperative behaviour. The accommodation–assimilation model argues that positive mood promotes assimilation (a top-down process in which one's internal knowledge structures are imposed onto the outside world) and accommodation (a bottom-up process in which internal knowledge has to be modified by external constraints). Therefore, the accommodation–assimilation model holds that the relationship between mood and trust depends on contextual cues (i.e., whether others are seen as trustworthy). Consistent with the accommodation–assimilation model, these findings suggest that although positive mood may increase trust in interactions between individuals, it can also be harmful for group interaction when negative cues are presented (Lount, 2010).

4.4. Emotional states and organisation

Barsade and Gibson (2007) found that while some people can control their feelings more than others, this does not mean that their colleagues and team members do not take notice of changes in their moods. It is also argued that all of these feelings (expression of mood) can be contagious. Barsade and Gibson (2007) by conducting literature reviews regarding emotional states in organisations underline their effects at work in which can be infectious to others. They refer to Southwest Airlines' advertising slogan about 'emotional contagion', which is "when we feel good it's contagious" (p. 37). Emotional states can be transferred between group members. If, for example, the boss has always portrayed a humorous character, his discord may be quickly identified because of his unusual body language or facial expressions indicating he is not in the same mood. Thus, those who perceive the dissonance may express concern.

Kelly and Barsade (2001) refer to the affective composition of a group as the result of the affective characteristics of the individuals who bring their moods, emotions and sentiments into the group (Figure 8). According to Kelly and Barsade, many factors can influence the contagion process of mood; however, this can vary between people. The intensity of the transference of emotional states amongst a group is dependent on the individuals' self-expression ability and the recipients' receiving capacity. For instance, people with greater non-verbal communication skills tend to influence others by their emotional displays (Cote & Hideg, 2011). Additionally, Kelly and Barsade (2001) noted that the degree to which a group can be affected via contagion depends on individuals who are good transmitters of emotion. Similarly, the degree to which a group's mood is shaped with good or bad emotion is influenced by the group members with good receiving capabilities (Kelly & Barsade, 2001). Barsade (2002) even claims that similar positive moods of group members can lead to greater contagion.

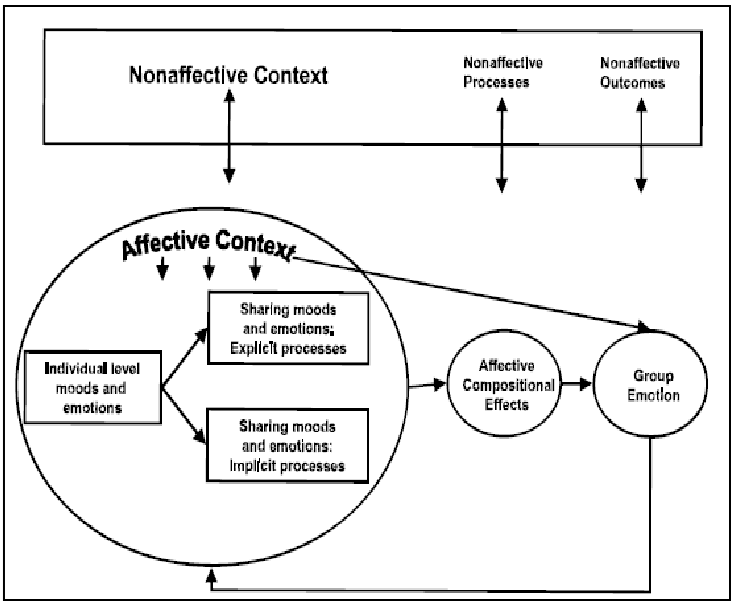

Figure 8. Moods and emotions in small groups and work teams (Kelly & Barsade, 2001, p. 101)

4.5. Mood and performance

Barsade and Gibson's (2007) meta-analysis and longitudinal study confirmed a direct relationship between mood and performance; they state that people with positive mood absorb more information and perform their work more efficiently than people in a negative mood. This concept is said to result from the research of Estrada, Isen, and Young (1997) with physicians whose emotional states were manipulated using gifts of candy. The doctors had to read the description of a patient and think out loud; their thoughts were recorded and rated while they tried to determine the proper diagnosis. Doctors with positive emotional induction were able to find the correct solution significantly earlier than those who did not receive a gift. The study suggests that positive mood can affect thoughts, improve flexibility and the information obtained can enhance decision-making. Similarly, Lane et al. (2001) found that mood is a performance predictor and functions to inform individuals of the likelihood of their success or failure. Using 451 school children with an average age of 12 years, Lane et al. administered a POMS depression subscale followed by running races to examine the impact of mood on performance. Participants were divided into two groups based on their mood state as indicated by the mood–performance scale (depressed, n = 273 and non-depressed, n = 178). As predicted, the depressed mood group reported higher scores on scales such as anger, fatigue, confusion and tension, and lower scores on the scale of vigour–activity as determined by the POMS questionnaire.

Not all researchers agree about the strength of the relationship between mood and performance (Beedie, Terry, & Lane, 2000; Renger, 1993; Rowley, Landers, Kyllo, & Etnier, 1999; Terry, 1995). For example, Beedie et al. (2000) found that the POMS has utility in prediction of performance outcome (success or failure) but it does not predict the level of achievement (i.e., novice, varsity or elite). The study comprised two meta-analyses of published studies which used the POMS to investigate the relationship between mood and performance outcomes and between mood and athletic achievements. The results revealed the effect sizes for the level of achievement were small (i.e., difference between having too little data to draw a conclusion and effect sizes which suggest no relationship). The larger effect related to the performance outcomes, which were moderate for vigour, confusion and depression, small for anger, and tension, and very small for fatigue.

Other researchers claim that the psychological measures and mood performance relationship varies from person to person (Sottilare & Proctor, 2011). Similarly, Lane et al. (2001) had previously found that the hypothesised mood and performance relationship was highly individualised. The theme was examined by comparing mood and performance amongst basketball team members. Players from the United Kingdom's basketball team (N = 10) completed a POMS prior to the games. Participants were given a score for each trait according to their responses to certain statements which included key words such as unhappy, tense, careless, and cheerful. For each statement, players stated how they felt at that moment, and over the previous day, a few days before, and the previous week. They had to use one of the following responses: not at all, a little, moderately, quite a lot, or extremely. The participants also completed a performance satisfaction questionnaire after each game. The predictive power of mood was highly individualised; the results revealed that only five of the players' moods had a significant relationship with their performance (Lane et al., 2001). This supports Sottilare and Proctor (2011), who assert that psychological measures such as self-reports could be biased by the desire to conform with expectations and not necessarily reflect true emotional states. Sottilare and Proctor argue that even physiological measures vary from person to person and can be misinterpreted. Instead, they suggest that hybrid approaches (combination of various methods) are more reliable as they are less limiting and use combination measures.

4.6. Mood and physical activity

Researchers have generally acknowledged the interrelationship between positive psychological states such as the 'feeling better syndrome' (Harris, 1984), the effect of reduced anxiety and depression with more self-confidence and increased vigour when participating in physical activities. Other issues, such as a possible dependent relationship between physical activities and performance, were investigated by Wilson, Morley, and Bird (1980). Wilson et al. recruited 30 men aged 20–45 years of age (10 highly professional [HP] marathon runners, 10 intermediate-level [IM] joggers and 10 non-exercisers [NE]), asked them to complete varying amounts of exercise and measured their mood throughout. As imagined due to the complexity of experimental design, the study was not standardised for all (i.e., varying amounts of exercise). Instead, the HP group had to complete more exercise than the IM group and the NE had to accomplish the least. Furthermore, the participants' age differences, their skills and experience together with their psychological states were perhaps the major issues which did not provide a profound outcome. Nevertheless, the HP and IM groups reported less depression, less anger, less confusion and more vigour than the NE group. The HP people also reported less fatigue and less tension than the NE. The HP and IM group did not differ significantly in fatigue and tension, but the HP had significantly less depression, anger and confusion and more vigour than the IM group. Despite the overall results of this study which revealed better mood for HP compared with IM and the least mood for the NE group, it failed to address other issues as stated earlier such as exercise amount, age and skills variations.

Wilson et al. (1980) state that psychological states such as the feeling better syndrome, low anxiety, low depression, high vigour and self-confidence are related to participation in physical activity. Their results suggest that a certain amount of exercise will enhance mood substantially, and they interpret this as support for the mood–performance congruence. To delve deeper into the relationship between mood and performance, Wilson et al. administered the POMS questionnaire to their three groups. The HP and IM groups reported lower depression, confusion and more vigour than the non-exercisers similar to the iceberg profile depicted in Figure 9. Furthermore, the HP group had higher mean scores in all categories than the IM group. Wilson et al. concluded that aerobic exercise lowers depression, tension, confusion and anger and increases vigour, a finding confirmed in a meta-analysis by Netz, Wu, Becker, and Tenenbaum (2005). Netz et al. (2005) found that the psychological benefits of physical exercise have been reaffirmed by numerous researchers, highlighting that mood can be manipulated by exercise.

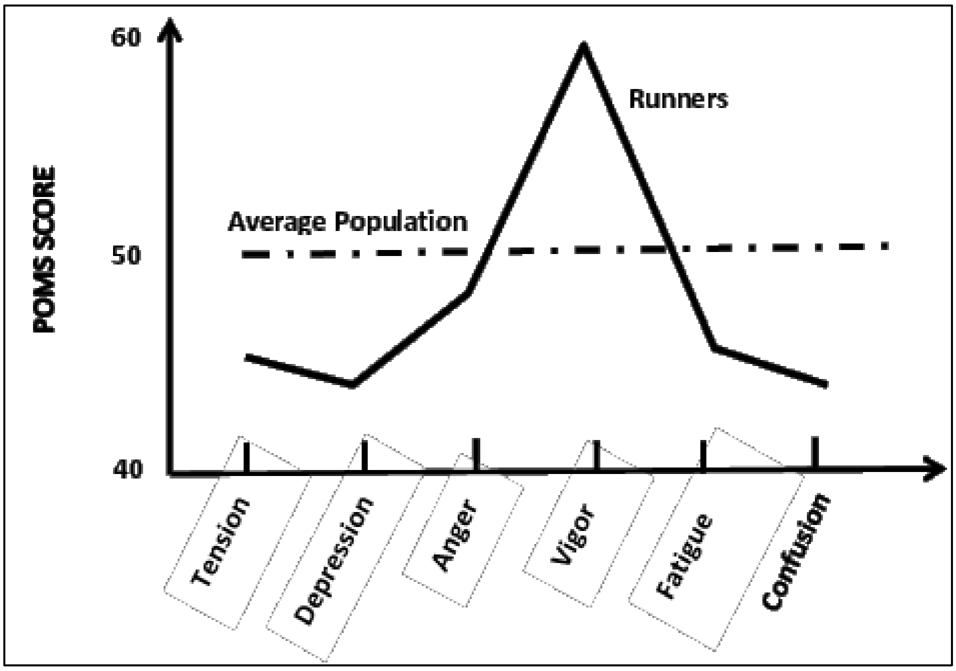

Figure 9. Mood Level – POMS Graph consistent with Morgan's iceberg profile (Wilson et al., 1980)

4.7. Age and gender

Factors such as age and gender are also believed to influence mood and performance. For example, Knez and Kers (2000) used a two-way ANOVA to assess the effects of indoor lighting and age on mood. Knez and Kers found that the young females preserved their moods better than young males, and demonstrated the superiority of younger adults in terms of their performance in memory and problem-solving tasks.

4.8. Mood, pre-task interest and performance

Another notion which has attracted researchers' attention is the interrelationship between mood, pre-task interest and performance. The contention is that people in a positive mood perform well in creativity tasks because they find them interesting, but their performance on a task will be impaired when more detailed information or a systematic process is required. Conversely, negative mood appears to facilitate systematic processing (Hirt et al., 1996). Like

Hirt, Sinclair and Mark (1995) argue that negative mood encourages a deeper and more systematic processing, whereas positive mood induction encourages a more superficial and heuristic style of processing. Hirt et al. (1996) noted that the relationship between mood and performance is complex. They claim that the induction of positive mood states produces an increase in decision-making efficiency and facilitates creative problem solving. However, positive mood induction weakens performance in areas such as arithmetical estimation and logical argument. Moreover, in some studies, inducing negative moods at the outset of a task has been found to improve task performance (Sinclair, 1988).

Eberhart and Hammen (2010) examined the transactional state of interpersonal stress and depressed mood for female college students in romantic relationships. The study focused on three vulnerability factors – attachment, reassurance seeking and dependency – to address participants' depressed mood. Despite evidence of an association of these three factors with vulnerability to depression, the mechanism through which interpersonal style (attachment, dependency and reassurance seeking) influences depressed mood remains unclear (Eberhart & Hammen, 2010).

4.9. Mood vs thoughts

Some researchers have taken a slightly different approach to studying the mood–performance relationship and focused on realistic outcomes directed by thoughts rather than mood. Churchill and Davis (2010) hypothesised that a realistic approach (i.e., combined high positive and high negative thinking) towards outcomes would be psychologically beneficial in stressful situations. Churchill and Davis state that the realistic orientation can be recognised through multifaceted personality constructs which was surveyed by Carver (1989). For example, Churchill and Davis, argue that thinking about negative outcomes is not necessarily a bad thing. Churchill and Davis studied the effect of realistic orientation (i.e., giving thoughts to both positive and negative outcomes) in the context of transition to motherhood by assessing 69 females who were expecting their first child before and after the birth. They found that relative to those who were categorised as positive or negatively oriented, females categorised as realists reported fewer depressive symptoms from pre-delivery to post-delivery. Churchill and Davis also found that the effects of negative thinking can be reduced if it is associated with hope and positive thoughts; in these circumstances the depressive effects of the 'negativities' will be reduced. In contrast, pessimists and realists who use their lifetime negative experiences as their motivating tool do not necessarily encounter negative outcomes (Churchill & Davis, 2010). Churchill and Davis confirm that people who think realistically and give thought to the negative consequences, instead of being pessimistic or detrimental, can deal with adverse events through problem-solving and coping strategies that can produce resilience to almost any hardship.

4.10. Mood and error

Some researchers have undertaken a more direct approach to determine whether temporary mood can influence error rate by utilising error as their assessment marker (Forgas, 1998). In line with that view, Forgas (1998b) found that negative moods decrease and positive moods increase the fundamental attribution error (FAE). The FAE is a judgment error, a tendency to explain the reasons for others' behaviour by undervaluing the impact of situational factors and overstating the role of individuals' personality traits (Moran, Jolly, & Mitchell, 2014).

Forgas (1998b) conducted three experiments. In the first experiment, 96 students received positive and negative feedback about their performance on a sentence completion task (mood induction by motivation). In the second, participants were asked to read about a student who had participated in a debate and written an essay about the debate later. Participants had to judge the popularity of the subject which was debated and express their perceptions of the writer's real attitude towards the essay (i.e., if the writer had chosen that position freely or was coerced to present the essay in that way). The effect of mood, essay direction and choice condition (i.e., free or coerced) on inferred attitude were assessed by a three-way ANOVA. Forgas found clear evidence that positive mood can increase the FAE, whereas negative mood results in greater attention to situational information and consequently reduces the FAE. Forgas used films as the mood induction method in the second experiment and found similar results. In experiment 3, Forgas used non-verbal visual tasks and participants' moods were manipulated through feedback they received about their performance. Experiment 3 was designed as an extension to experiment 1 and 2 to gather further evidence about the correlation between mood and FAE. The third experiment confirmed the previous results and revealed the changes in the FAE which were linked to the mood changes.

Other studies have focused on the link between affect and attribution for achievements, including showing that affect can influence the attributes by the mood congruent information (Rusting & DeHart, 2000). For example, people with happy mood tend to identify internal causes for their success and their achievements and external causes for their failures (Forgas, Bower, & Moylan, 1990). Conversely, depressed people are more likely to search for internal attributes for their failures than for their successes, blaming themselves when doing badly and not taking credit when doing well (Forgas et al., 1990).

4.11. Four perspectives

Despite wide and often diverse opinion amongst researchers, there are four mainstream schools of thought about the correlation between mood and performance. The first school of thought relates to those who affirm the link and believe people bring all of their personality, experience, traits, influences, moods and emotions to work and those attributes can affect their performance (Barsade & Gibson, 2007). The second takes the view that, despite more than 250 studies confirming the link, the evidence supporting the link is equivocal (LeUnes & Burger, 1998). The third school acknowledges the connection between mood and performance but adds that individual differences affect the strength of the correlation (Kelly & Barsade, 2001). The fourth school also acknowledges the link but notes that the effect of positive mood on performance is not proportional to the effect of negative mood on performance (Hirt et al., 1996).

4.12. Summary

Although there is not enough statistical data to illustrate the reliability of one study set over another, the bulk of the evidence suggests that there is a link between mood and performance. However, it remains unknown how the context or situation influences this relationship. For example, most published studies to date have focused on human performance in routine and non-life threatening situations, such as the physical fitness studies conducted by Netz et al. (2005), studies of mood states and athletic performance by Beedie et al. (2000) and medical examinations in controlled environments, such as analysing patients' depressed moods in hospitals or pathological studies in laboratories (Russell, 2003). The present research differs from those studies in seeking to examine the effect of mood state on performance in non-normal conditions.

In aviation, non-normal situations are defined as situations in which an aircraft needs to land before its intended destination (FAA, 2018; CASA, 2014). According to CASA, those situations could be a result of an aircraft malfunction or a combination of problems that diminish the aircraft's airworthiness, either mechanically, due to environmental factors or a medical condition which requires speedy medical attention for the flight crew or passengers. An expeditious landing reduces the likelihood of potential additional problems which may result in compromise of safety, and as shown in this thesis to date, efficient aircraft evacuation is the best way to minimise casualties. An investigation into whether mood manipulation can improve performance, defined here as a speedy escape from an aircraft in an emergency, has obvious value for aviation safety and human well-being.

Chapter 5: Experiment 1 – Effect of mood on performance in non-normal situations

As discussed in previous chapters, it is well documented that mood can affect performance. Positive mood, such as happiness, has been shown to improve the quantity of information retained, and the quality of teamwork, work efficiency, situational awareness and decision-making. In contrast, negative mood, such as sadness, can cause performance to deteriorate by disrupting information processing, reducing work efficiency and increasing error. Researchers investigating the interrelationship between mood and performance have commonly focused on routine and non-life-threatening situations such as academic performance, retail and marketing operations or sport activities. What remains unknown is how mood state can affect performance in non-normal, unpredictable situations such as passenger rapid disembarkation from an aircraft due to fire or smoke in the cabin. In hazardous events, erroneous behaviour has the potential to cause serious consequences.

The main aim of the present research was to investigate the effect of mood on performance in a non-normal situation, namely a (simulated) unscheduled aircraft evacuation, by manipulating the mood of two groups of study participants. It was hypothesised that participants in the positive mood manipulation condition would commit fewer errors and complete the evacuation quicker than participants in the negative mood manipulation condition. The research was approved in advance by the University of New South Wales (UNSW) Ethics Panel (see Appendix A).

5.1. Method

The research was conducted in two stages. The first stage tested the efficacy of the mood manipulator in one group of participants, while the second stage tested the effect of the mood manipulator in situ, namely its effect on performance during an unscheduled evacuation of an aircraft with a separate group of participants. While both stages could have been incorporated into one experimental sequence with a single group of participants, it would have required the measurement of mood three times, as opposed to two, the third time part-way through the experimental sequence, thereby disrupting the natural flow of events during the evacuation and jeopardising the applied objective (i.e., ecological validity) of the research.

5.2. Stage 1

Participants. Fourteen students and university staff (eight female), with an average age of 33 years (SD = 14.33), participated in stage 1 of the research. No reimbursement was provided. The average time to complete this stage per participant was 5 minutes. The research, including the stimuli for both stages of the study (i.e., mood manipulation and unscheduled aircraft evacuation exercise) was approved in advance by the UNSW Ethics Panel.

Material. The study materials consisted of an information sheet, consent form, demographics questionnaire (i.e., age, gender), six photographs (three unpleasant and three pleasant images) serving as the mood manipulators, a photograph rating sheet and a mood measurement scale (POMS short).

Mood manipulation: The mood manipulating stimulus was consistent with that employed by Richards and Whittaker (1990), and contained three unpleasant images (scenes of violence) and three pleasant images (scenes of flowers). It was accompanied by a photograph rating sheet containing three questions designed to ensure participants were engaged in the photographs (questions related to whether the photographs were pleasant or unpleasant, attracted their attention, and whether they saw professionalism in each photograph). Participants' responses on the photograph rating sheet were reviewed (see Appendix A), due to the subjective nature of the questions as well as the objective of the exercise (the focus was on engagement and reflection on the images).

Mood measurement: Participants mood was measured using a shortened version of the Profile of Mood States (POMS) survey (i.e., the POMS-SF; Terry et al., 2003). The long form of the POMS survey (the original survey) has been extensively used in a variety of settings including hospitals, universities and outpatient facilities (Curran, Andrykowski, & Studts, 1995; Shacham, 1983; Terry et al., 2003; Zohar, 1999). The long version has 65 items covering six factors (tension–anxiety, depression–dejection, anger–hostility, fatigue-inertia, vigour–activity and confusion–bewilderment), the short version has the same number of factors but only 37 items, and can be administered in approximately half the time without compromising the scale (Shacham, 1983). Shacham confirmed the validity of the POMS-SF through a series of correlational analyses which revealed a very high correlation between it and the POMS (above r = .95 for each factor).

Procedure: Performance was measured in two ways, the first involving total time to complete the evacuation exercise and the second involving the number of errors committed during the evacuation. For the latter, an error checklist was created through a task decomposition method (Stanton, Salmon, Walker, Baber, & Jenkins, 2005), based on the information contained in the pre-flight safety briefing. A maximum of 10 possible errors were identified. Participants were recruited from the student population (undergraduate and postgraduate) and the staff at the UNSW. They were provided with an information sheet and a consent form. Following this, participants were randomly assigned to one of two groups (negative or positive mood manipulation group) and asked to complete the POMS-SF. Depending on the group of random assignment, they were shown either three unpleasant or three pleasant photographs and asked to concentrate on each photograph for 30 seconds and rate them by completing the photograph rating form (see Appendix A). After they had completed the photograph rating form, a second POMS-SF questionnaire was administered as a final step of the study. The total time taken to complete stage 1 was approximately 5 minutes.

5.2.1. Results

In order to determine if the two mood manipulators were effective, mood scores prior to the mood manipulator were compared to mood scores following the mood manipulator for each experimental condition (positive vs. negative mood manipulation). However, prior to this, it was important to ensure that each participant evaluated the photographs as asked. This was achieved by reviewing the material written by each participant on the photograph rating sheet to ensure that they had looked at and thought about the pictures presented. All participants wrote meaningful comments, and as a result, no participant was excluded. Mood was calculated based on Shacham's (1983) total mood disturbance (TMD) scores for the POMS-SF using the formula Depression–Dejection + Tension–Anxiety + Anger–Hostility + Fatigue–Inertia + Confusion–Bewilderment + (24 – Vigour–Activity). Due to the relatively small sample size, a non-parametric Wilcoxon Signed-Rank *t* test was used. The results revealed that both mood manipulators were effective in positively influencing participants' mood in the desired direction. Specifically, TMD scores in the positive mood manipulation group decreased from 27.16 to 26.04 (lower scores on TMD equals more positive mood; z (N = 6) = 2.20, p = .028). Similarly, the TMD score for the negative mood manipulation group increased from 24.31 to26.93 (a higher TMD score equals more negative mood; z (N = 8) = 1.96, p = .05). This result indicates that the mood manipulators were effective in influencing participants' mood in the desired direction.

Further analysis of the data revealed that the influence of the mood manipulation on the mood structures was consistent with the study's hypothesis. The positive mood manipulation group experienced a 56% reduction in scores on the Depression factor (from .48 to .21), 54% reduction on the Confusion factor (from 1.17 to .54), 51% reduction on the Tension factor (from .88 to .43), 63% reduction on the Anger factor (from .43 to .16), 31% reduction on the Fatigue factor (from 1.03 to .71) and 14% reduction on the Vigour factor (from 1.60 to 1.38). The reduction of Vigour for the positive mood group was not consistent with the anticipated trend. This may be due to the sample size which could be adjusted with a larger sample population. On the other hand, the negative mood group showed increases in: Depression (77%, from .21 to .91), Anger (78%, from .16 to .73), Confusion (22%, from .54 to .66), and Tension (27%, from .43 to .55), and a 26% reduction in Vigour (from 1.38 to 1.02). Fatigue change (from .71 to .60, a 15% decrease), was the only factor for the negative mood manipulation group which did not change in line with the study's hypothesis. Again, this could have been a the result of the small sample size, as stated above.

5.3. Stage 2

Having established the efficacy of both the positive and negative mood manipulators, the next step was to test the effect of these mood manipulators on participants' performance during a simulated unscheduled evacuation of an aircraft.

Participants. Forty-five university students (15 female), with an average age of 21.9 (SD= 3.96) years, who had undertaken an average of three flights within the last 12 months and nine flights within the previous 5 years completed the research. All participants were reimbursed with a $10 bookshop gift voucher for their time.

Design. The research was designed to examine the effect of mood on performance during a non-normal situation. Two independent variables featured, one repeated measures factor and one between-groups factor. The repeated measures factor, Evacuation, contained two levels (before vs. after), as did the between-groups factor, Mood (negative vs. positive). Two dependent variables were employed: number of errors during the non-normal and unscheduled evacuation, and time taken to exit the aircraft. For all statistical procedures, alpha was set at .05.

Material. The documentation consisted of an information sheet, consent form, demographics questionnaire (i.e., age, gender), a Macquarie Dictionary and Thesaurus for foreign students, flight status information sheet (giving a description of the flight), and a photograph rating sheet (consistent with Stage 1). In addition, a Panasonic DMC-FS20 video camera and tripod was used to record the evacuation .

Aircraft cabin. A mock aircraft cabin, reflecting a Boeing 737-800 single-aisle configuration was constructed within the research facilities on campus. The aircraft set-up comprised five rows containing 15 seats, each with a moulded high-backed plastic seat, one of which was modified to resemble an aircraft seat by fixing a seat belt and compartment below the seat to store a lifejacket. The aircraft cabin contained one overwing emergency exit (type III - a rectangular opening of not less than 20 inches wide by 36 inches high) and one door (also used as an emergency exit). All of the 15 seats and nominated emergency exits were set up on the port (left) side of the passenger cabin. Seat pitch for the passenger rows was set in accordance with the actual aircraft dimensions at 80 cm and for the emergency exit row at 99 cm (slightly wider) in accordance with regulations. Identical seat spacing (pitch) was employed to reflect as closely as possible that present in commercial aircraft.

The focus of the present research was the standard economy class scenario (see Figure 10), with two emergency exits. One exit (overwing) was located immediately behind the participant's seat, and the second exit was located two rows in front of the participant. Hence, the participants had a choice of exits. The emergency exits' features, in terms of size and signage, were a direct replication of those present on the Boeing 737-800. All emergency exits were marked with 'EXIT' signs. Other materials for the study included one aviation lifejacket (permission granted from airline to use the aviation lifejacket) and a pre-flight safety briefing video (lasting 4 minutes 30 seconds). The briefing video was a safety presentation which contained references to the emergency safety card, seat belts and seat belt signs, restrictions on the use of electronic devices and mobile phones, locations of emergency exits, smoking prohibitions, oxygen and lifejacket locations and usage. The same mood manipulator (photographs) and measurement (POMS questionnaire) were employed as in stage 1.

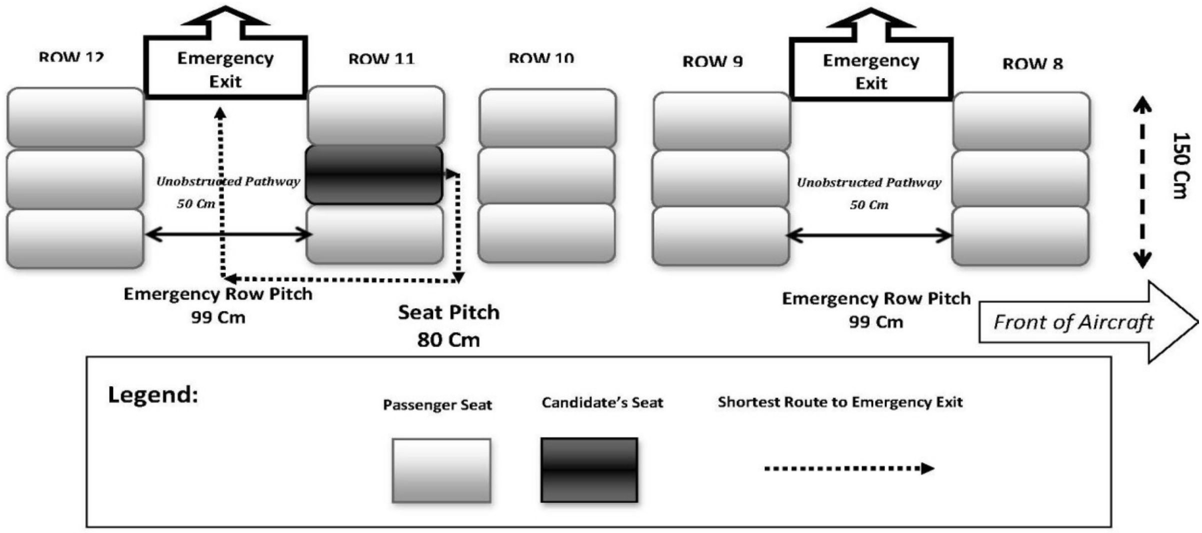

Figure 10. Experimental design layout of cabin

Procedure. Participants were recruited from the student population (undergraduate and postgraduate) at the UNSW. The method entailed only one participant completing the study at any time. All participants were informed that the study was concerned with examining the effects of mood on performance in an aviation setting. They were informed both verbally and through the information sheet that they would be asked to participate in an unscheduled evacuation of an aircraft cabin. However, they were not informed when this event would occur during the experiment.

Each participant was randomly assigned to one of two groups (unpleasant or pleasant image group) and asked to read an information sheet and sign a consent form. Participants were then asked to complete the 37 item Profile of Mood States – Short version (POMS-SF) questionnaire. Following this, and depending on the group of random assignment, participants were given either three unpleasant or three pleasant photographs and asked to concentrate on each photograph and rate them by completing the photograph rating form. After the participants had completed the photograph rating form, the simulated flight commenced. This involved giving the participants one item of carry-on luggage (a backpack), directing them to a nominated seat, asking them to read the flight status information sheet (which stated that they were about to depart from Sydney, Australia for Melbourne, Australia, with a planned track over water), and inviting them to watch the pre-take-off safety briefing video. The safety briefing video reminded the participant/passenger about the procedures regarding an overwater emergency, the location of the lifejacket and how to use the lifejacket in case of an emergency. The video mentioned putting their personal items either in the overhead compartment or below the seat in front. As there was no overhead storage in the mock aircraft cabin, participants placed their belongings under the seat in front.

The facilitator moved to his seat and waited for 30 seconds, simulating the take-off roll. After take-off, the facilitator stood up and yelled “Ladies and gentlemen, we have an emergency. We have ditched, we have to evacuate the aircraft immediately!” and subsequently shouted “evacuate, evacuate, evacuate, high heels off!” three times.

The correct response for the candidate should have been: pull the lifejacket out from the seat and place it on, buckle the straps according to the pre-take-off safety video and approach the nearest exit. The entire exercise from the beginning of take-off until approaching the exit was recorded to determine the exact time taken and the number of errors committed during the procedure. Each candidate could commit a maximum of 10 errors (see Table 2).

Table 2. Error checklist employed to assess participant performance during simulated evacuation exercise.

Did the participant:

1.	Forget the lifejacket and was to evacuate the aircraft without it?	Yes ☐	No ☐
2.	Know the location of the lifejacket – i.e.,: able to find it?	Yes ☐	No ☐
3.	Pull out the lifejacket?	Yes ☐	No ☐
4.	Put on the lifejacket correctly - placing the rounded side of the jacket behind the head and the squared side in front?	Yes ☐	No ☐
5.	Tie the strap properly – putting the strap around the waist circumference?	Yes ☐	No ☐
6.	Attempt to inflate the lifejacket prior to exiting the aircraft?	Yes ☐	No ☐
7.	Attempt to carry any personal items during the evacuation – i.e.,: bags, laptop computer, etc.?	Yes ☐	No ☐
8.	Choose the nearest emergency exit?	Yes ☐	No ☐
9.	Have any mishap during evacuation – i.e.,: tripped, slipped, lose balance?	Yes ☐	No ☐
10	Ask any questions regarding steps 1-8 after commencing evacuation – “Evacuate, Evacuate, Evacuate”?	Yes ☐	No ☐
Note: The entire process from the commencement of evacuation until completion took ____________seconds.			

Following the unscheduled evacuation, participants were required to complete a second POMS-SF questionnaire. Finally, the participants were thanked for their contribution and presented with a $10 bookshop gift voucher. The average time taken per participant was approximately 30 minutes.

5.3.1. Results

Since the main aim of the present research was to examine the effect of mood on performance in a non-normal situation, it was important to establish that the mood manipulators were effective and the random allocation of participants to each group was successful. As a result, a mixed repeated measures ANOVA was conducted with Evacuation (before vs. after) as the repeated measures factor and Mood (negative vs. positive) as the between-groups factor. Consistent with stage 1, TMD score was the dependent variable. With the ANOVA test assumptions satisfactory, the results revealed a significant main effect for Evacuation (F[1, 43] = 43.29, $p < .001$), a significant interaction between Evacuation and Mood (F[1, 43] = 22.64, $p < .001$), as well as a significant between-groups main effect for Mood (F[(1, 43] = 15.64, $p < .001$). As can be seen in Figure 11, TMD scores prior to the mood manipulation in the negative mood group (mean = 25.86, SD = 2.74) were similar to those of the positive mood group (mean = 24.63, SD = 2.18), as determined by an independent samples t test with alpha adjusted to .025 (Bonferroni adjustment .05/2) to control for multiple comparisons; t (43) = 1.66, p = 052. This result suggests that the random allocation of participants to each group was successful. In contrast, after mood manipulation a statistically significant difference was present between the TMD scores of the negative mood group (mean = 30.73, SD = 4.27) and the positive mood group (mean = 25.41, SD = 2.89), t [43] = 4.97, p < .001). This result suggests that the mood manipulation was effective where participants in the negative mood group had a higher TMD score, than participants in the Positive Mood group.

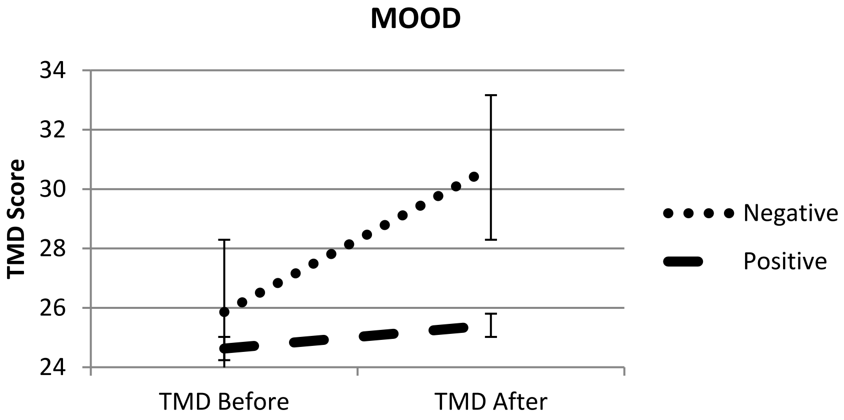

Figure 11. Participants' mean TMD score distributed across mood group, before and after the mood manipulation

The main effect (repeated measures) for Evacuation indicates that mood changed following the evacuation, resulting in more negative mood (mean pre-exposure TMD = 25.26 (SD = 2.53) and mean post-exposure TMD = 28.13 (SD = 4.51); lower TMD scores represent more positive mood), while the between-groups main effect relating to Mood indicates that the negative mood group obtained a higher mean TMD score than the positive mood group.Recall a lower TMD score equals a more positive mood. In terms of the Evacuation by Mood interaction, a series of simple effects analyses were conducted in order to determine where the significance lay.

No statistically significant difference was evident between TMD scores for the positive mood group before (mean = 24.63, SD = 2.18) and after (mean = 25.41, SD = 2.89) the mood manipulator, as determined by a dependent samples *t*-test with alpha set at .025 (t (22) = 2.19, p = .04). However, a statistically significant difference was evident between TMD scores for the negative mood group before (mean = 25.86, SD = 2.74) and after (mean = 30.73, SD = 4.27) the mood manipulator, as determined by a dependent samples *t*-test with alpha set at .025 (t (22) = 6.35, p < .001). This result indicates that the mood manipulation was most effective in lowering mood in the negative mood group, as intended.

Table 3 provides a detailed breakdown for each factor comprising the POMS-SF scale, including the TMD score. Mood scores increased after mood manipulation on each of the six factors for the negative mood group. In contrast, scores on four of the six factors largely remained unchanged for the positive mood group after mood manipulation. The two factors which changed – Tension and Confusion – increased.

Table 3. Mood state before and after exposure to mood manipulation and percentage change for each experimental group

Mood State	Positive			Negative		
	Mean Before (SD)	Mean After (SD)	% change	Mean Before (SD)	Mean After (SD)	% change
Depression	0.27 (.50)	0.32 (.61)	+19	0.32 (.43)	1.10 (.96)	+244
Vigour	1.52 (.97)	1.52 (.99)	0	1.36 (.82)	1.37 (.75)	+.7
Anger	0.23 (.42)	0.24 (.49)	+4	0.29 (.40)	1.12 (.99)	+286
Tension	0.46 (.46)	0.97 (.78)	+111	1.03 (.88)	1.73 (.96)	+68
Confusion	0.41 (.40)	0.71 (.66)	+73	0.81 (.67)	2.53 (1.18)	+212
Fatigue	0.77 (.73)	0.69 (.72)	-10	0.86 (.83)	1.62 (1.09)	+88

Note: TMD score calculated using the formula Depression–Dejection + Tension–Anxiety + Anger–Hostility + Fatigue–Inertia + Confusion–Bewilderment + (24 – Vigour–Activity).

Recall that the purpose of the pre-flight safety briefing is to educate passengers about how to behave in the event of an emergency. Ideally, the compliant behaviour of educated passengers allows the flight attendants to optimise their time and perform critical safety roles such as identifying which emergency doors have to remain closed (due to wind and/or fire), deploy and secure slides, inflating the life rafts (during ditching), facilitating rapid disembarkation (less than 90 seconds), assisting people with restricted mobility and carrying small children.

The positive mood group outperformed the negative mood group in terms of the total time taken to complete the exercise. On average, the participants in the positive mood group took almost half as long as the negative mood participants (37 vs. 66 seconds). Furthermore, the negative mood group averaged significantly more errors than the positive mood group (2.57 compared with .36). Table 2 outlines these errors, which largely involve the identification and appropriately use of the lifejacket. Behaviour that was counter to exiting the aircraft in the shortest possible time was also countered as an error. Therefore, behaviour such as failing to choose the closest exit, experiencing a mishap while evacuating (i.e., tripping), or asking for instructions were also classified as errors. As Figure 12 shows, only three participants (all from the negative mood manipulation group) committed an error classified under point 9 of the error checklist (mishap during evacuation – all lost balance), while two participants in the negative mood manipulation group committed errors classified under point 10, one asking which exit to use and the other how they should wear their lifejacket. However, participants who failed to remove their lifejacket from their seat were reminded to return and collect their jacket, a common practice on commercial aircraft that carry no other flotation devices (i.e., life raft or floating emergency slide).

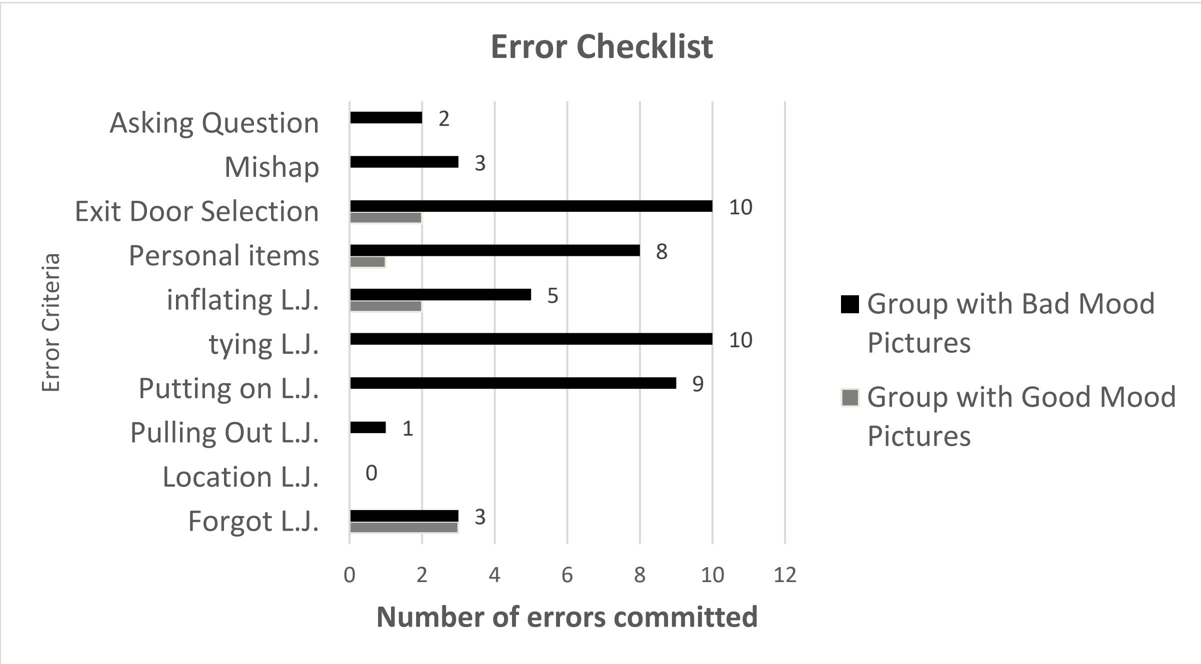

Figure 12. Total number of errors committed per mood manipulation group distributed across error category as per Error Checklist

Participants in the positive mood manipulation group committed less than one error per exercise on average (0.36 errors, SD = 0.66) while participants in the negative mood manipulation group committed an average of seven times as many errors during the same exercise (2.57 errors, SD = 1.75). With the assumptions of normality and homogeneity of variance met, the results of the independent *t* test indicated a statistically significant difference between the positive and negative mood manipulation groups in terms of time taken to complete the emergency evacuation (t (43) = 3.64, p = .0005). The total time taken to complete the evacuation for participants in the positive mood group was 37.50 (SD = 19.63) seconds, while participants in the negative mood group took almost twice as long (66.09, SD = 31.41 seconds).

The second analysis compared the performance based on number of errors between the two experimental groups. Using a *t* test for unequal variances because of violation of the assumption of homogeneity of variance, a statistically significant difference was found between the positive and the negative mood manipulation groups in terms of number of error committed (t (43) = 5.62, p < .001).

It was expected that frequent flyer participants with the knowledge of the pre-flight safety briefing content would complete the emergency evacuation quicker and with fewer errors than participants who were not frequent flyers. In order to examine if prior exposure to pre-flight safety briefings affected participants' performance in terms of number of errors or egress time (dependent variables), a series of correlational analysis was conducted between these two variables, and number of flights participants had flown in the previous twelve months and five years. No statistically significant relationships were detected, with the largest correlation being r(31) = .224 (p = .226).

5.4. Discussion

The effect of mood on performance in normal situations/conditions has been widely examined and the results commonly confirm a mood–congruence relationship. For example, salespeople with upbeat demeanour have been found to encourage purchasing behaviour (Pugh, 2001) while lawyers using an aggressive and angry tone have been found to obtain compliance from their rivals (Pierce, 1995). A common theme in much of the research in this area is a focus on behaviour in everyday situations. Previous research has not determined whether the mood–performance relationship extended to uncommon situations, such as an unscheduled evacuation of an aircraft as tested in the present research.

The results from the present research suggest that the effects of mood on performance in a non-normal situation such as an unscheduled evacuation of an aircraft are similar to those found under normal conditions. Individuals in the positive mood manipulation group outperformed individuals in the negative mood manipulation group in terms of the time to complete the evacuation. Similarly, participants in the positive mood manipulation group committed significantly fewer errors than participants in the negative mood manipulation group during the same evacuation exercise. These results suggest that mood affects performance even in emergency situations. The obvious conclusion is that manipulation of mood can be used as a tool to improve performance and safety. While this result is not new; recall Muir and Thomas (2004) were able to manipulate egress time (negatively affect egress time) in an emergency evacuation through the use of financial incentives as financial rewards can motivate the decision-making process and correct mood congruency biases (Ding & Beaulieu, 2011). Such incentives may provide airlines some insight into simple and potentially effective methods to positively influence passengers' behaviour in the unlikely event of an emergency.

The results of the present study illustrate that a simple exercise such as the presentation of three positive or negative images followed by a short reflection on those images was enough to manipulate mood in the desired direction. This positive result not only supports previous research in this area (Richards & Whittaker, 1990), it highlights that the benefits of mood manipulation may not be limited to everyday situations, but situations that are rarely experienced and for some, unimaginable.

The finding of increased tension–anxiety and confusion–bewilderment mood states of the participants in the positive mood group after the manipulation were unexpected. Recall participants were randomly allocated to each group (positive or negative mood group). Such a process should guard against this, which may correct itself by simply increasing the sample size. Despite this unexpected result, the results do however trend in the predicted direction given the experimental manipulation. As would be expected, experience of an unscheduled evacuation (i.e., an emergency egress) of an aircraft, albeit a mock situation, produced increased levels of tension. However, being in a positive mood reduces the extent to which this spikes.

5.5. Application and future studies

From an applied perspective, these results have important implications within the aviation environment specifically, the airline industry. Moreover, consider the situation this study was attempting to replicate, namely an emergency ditching exercise shortly after take-off and not long following the pre-flight safety brief; a situation similar to that recently experienced by the US Airways flight 1549 which made an emergency landing in the Hudson River (NTSB, 2010). Hence, based on the results of the present research it would seem that the delivery of this brief is an opportunity to not only educate passengers about how to perform in an emergency, but is a chance to positively manipulate their mood, and ultimately their performance if something untoward was to occur.

Future research could examine other simple and non-evasive methods to promote positive mood in such an environment. For example, it is well known that certain colours namely, cool' colours, such as yellow, have a calming effect (Samuels, 1999; Stone & English, 1998). Similarly, too little light or too much light can adversely affect mood (Kuller, Ballal, Laike, Mikellides, & Tonello, 2006), as well as certain music (Moon et al., 2014; van der Zwaag et al., 2012). Whether colours and/or light could be employed in certain areas of an aircraft to manipulate mood and ultimately increase performance in both normal and non-normal situations remains unknown.

It is also well documented that music can have an effect similar to colour on mood (Beh & Hirst, 2010; Murrock & Higgins, 2009). In fact, listening to music (individually selected) while driving has been found to influence as well as maintain certain moods (van der Zwaag et al., 2012). It has also been found to positively influence respiration rate, and hence driving behaviour. Based on the results of the present research, it would be expected that music would produce a similar effect during an emergency evacuation, but this remains untested.

The present research largely employed young university students (average age 21.9 years in stage 2), mostly male. Despite some studies conducted by scholars such as Phillips, Smith, and Gilhooly (2002) which illustrate that older adults experience greater executive function (i.e., judgment, control and planning) impairment than young adults when their mood is manipulated, it remains unknown if this effect applies during an emergency situation as tested in the present research, and hence is another area for future research.

It also needs to be acknowledged that the experimental sequence probably affected participants' mood in stage 2 of the present research. Recall stage 1 tested the efficacy of the mood manipulators in isolation, which proved effective in manipulating participants' mood in the desired direction. However, following the unscheduled evacuation in stage 2, participants' scores on the Tension and Confusion factors increased in the positive mood group (in addition, negative mood manipulation amplified participants' mood in the negative mood group). Hence, it is conceivable that the unscheduled evacuation itself adversely affected participants' mood, as might be expected in an emergency situation. Nevertheless, there were still benefits of positive mood compared to negative mood in this setting. Therefore, future research should examine other non-invasive measures of mood to appropriately document this impact. However, at present there are no known tests that fit this description; nonetheless when these become available, this is an area for future research.

5.6. Limitations

While the results from the present study reflect favourably on the existence of a relationship between positive mood and performance in a non-normal situation, they are not without their limitations. The most obvious is that the research was conducted in a mock setting as opposed to a real aircraft cabin. For ethical reasons the latter could not be employed; whether performance would have differed if the study was conducted in an actual aircraft remains unknown. Comparisons of simulated and actual aircraft accidents (e.g. Miyoshi et al., 2012), suggest that performance is similar, but this remains untested and therefore limits the extent to which the results can be generalised.

The sensitivity of the mood scale employed in the present research might have affected the results. While the POMS questionnaire has been used extensively (Shacham, 1983; Terry et al., 2003), its responses can be manipulated, as with all self-reported scales. While there is no evidence from the present research to suggest participants manipulated their responses on this scale, it does need to be noted that this could have occurred and future researchers should consider employing alternate mood measures to guard against this.

5.7. Conclusion

This study examined the relationship between mood and performance in aviation during a non-normal situation (i.e., an emergency). This research followed Richards and Whittaker's

(1990) mood manipulation methodology, examining participants' mood before and after an emergency aircraft evacuation. The results reflected those in normal situations, in that positive mood improved performance in terms of error reduction and time to complete the task, whilst negative mood reduced performance. The results suggest organisations and personnel within the aviation industry and other safety-critical industries should aim to create an environment which encourages a positive mood state, thereby facilitating improved performance in an emergency situation if something untoward was to occur.

Chapter 6: Experiment 2– pre-flight safety briefings, mood and information retention

The results of Experiment 1 revealed that mood can moderate performance in emergency situations, in a way similar to that in routine situations, and suggests a direct and positive correlation between mood and performance under stressful conditions. The emergency situation tested was a rapid evacuation of a passenger aircraft after ditching in water, in which any delays in terms of rapid evacuation can result in increasing the risk of fatal or serious injuries (i.e., smoke or fire requires rapid disembarkation from an aircraft). Airline passengers often fail to attend or undermine the importance of safety material contained in the mandatory pre-flight safety briefing prior to flights. In attempts to increase passengers' attention to the safety briefing, some airlines are employing humour to convey safety information or using celebrities to deliver the pre-flight safety briefing, both of which could also affect passengers' mood. For airlines, the delivery of the pre-flight safety briefing prior to a commercial flight is not only an opportunity to educate passengers about the safety features on-board the aircraft they are flying, but a possibility to positively influence their mood and as a consequence, enhance their performance for the rare event of an emergency.

Experiment 2 sought to examine whether the pre-flight safety briefing could be used to positively impact passengers' mood. According to Molesworth (2014), airline passengers remember less than 50% of the key safety messages contained in the pre-flight safety briefing, which may explain why many passengers behave contrary to the instructions given during an emergency. The research described in this chapter was designed to examine whether the recall of key safety messages contained within the pre-flight safety briefing was influenced by the style of briefing. However, it was necessary to determine if some passengers such as frequent flyers with prior knowledge of the content of safety briefing could influence the outcome of present study. Hence, the present research sought to answer the following research question

(RQ2): Can individuals' mood be manipulated through a pre-flight safety briefing and if so, is there a relationship between mood and retention of information contained in the briefing?

Therefore, it was hypothesised that employing humour or celebrities in a pre-flight safety briefings can positively affect individuals' mood as well as their ability to recall key safety messages presented in the briefing.

6.1. Method

Participants. Eighty-two participants (55 male, average age 19.36 years and 27 female, average age of 19.26 years) with an overall average age of 19.33 (SD = 2.04) years were recruited from the student population at the UNSW. All students volunteered their time, and no reimbursement was provided. The research was approved in advance by the UNSW Ethics Panel.

Design. A 2 x 3 mixed repeated measures design with mood comprising two levels (mood prior and mood after) as the repeated measure variable, the pre-flight safety briefing video as the between-groups variable, and three conditions (standard video, humorous video, movie theme video) was employed. A series of correlational analyses was employed to investigate the relationship between prior flight experience (number of flights in last year and five years) and safety information recall. Mood, measured by the Total Mood Disturbance (Shacham, 1983), was one dependent variable and recall performance – percentage of key safety messages remembered –as a percentage featured as the second dependent variable.

Materials and equipment. The research materials comprised an information sheet, consent form, demographics form (age, sex, previous flight experience), Profile of Mood State Questionnaire – Short Form – consistent with Experiment 1 (POMS-SF; Shacham, 1983), pre-flight safety briefing video A (standard video); pre-flight safety briefing video B (humorous video), pre-flight safety briefing video C (movie theme video), and a comprehension test form (see Appendix B). The comprehension test form, previously employed by Barkow and Rutenberg (2002) and Molesworth (2014), contained headings corresponding to the key safety message themes within each video (see Table 4). In completing the comprehension test form, the participants' task was to recall as much as they could from each video under each safety message heading. The three pre-flight safety videos were produced for the same airline, and the material to be covered in the briefings is dictated by governing bodies such as the FAA and CASA, so the main safety themes were identical across the videos.

Table 4. Topics covered in the pre-flight safety videos and the objective of the key safety messages

Topic	Objective of message
1 – Baggage	Storage locations
2 – Seat belt	Operation of seat belts
3 – Oxygen	Operation and timely usage of oxygen
4 – Brace position	Brace position during emergencies
5 – Lifejacket	Location and timely usage of lifejackets
6 – No smoking	Fire hazards and no smoking policy
7 – Lights	Guidance to the aircraft exit doors by the floor aisle lights
8 – Exits	Location of emergency exits and selection of nearest exit
9 – Electronic device	Electronic devices and their interference with aircraft systems
10 – Seat position	Seat adjustment prior to take-off & landing

The standard pre-flight safety video (video A) used a male narrator to deliver the safety message. Each section of the video was signposted by a theme heading such as 'cabin baggage', 'seatbelt', 'oxygen' and so on, as outlined in Table 4. In each theme, actors demonstrated the desired behaviour relating to the safety messages. No subtitles featured in the video.

The humorous pre-flight safety video (video B) is designed to be a humorous safety video which follows the same format as video A. However, introducing the video are two personnel dressed as cabin safety officers. In contrast to video A, each section of the video is not signposted and the personnel featured in the video are all dressed in aerobic exercise clothes and dance between key safety messages(Air NZ, 2011). A man similarly dressed in aerobic clothes explains the safety features of the aircraft, interjecting humour where possible while performing choreographed disco moves. Throughout the video, the dance music similar to the 70s disco music features and the lyrics to the song are only audible when there are long breaks between safety messages. The video concludes with the same two people introducing the video and wishing passengers an enjoyable flight. The total duration of this video is 3 minutes and 39 seconds (Table 5).

Table 5. Key components in the three pre-flight safety videos

Content	Video A	Video B	Video C
	(standard)	(Disco Inspired)	(Hobbit)
Audio humour	Nil	Yes	Nil
Visual humour	Nil	Yes	Nil
Movie themed	No	No	Yes
Male &/or Female voice-over	No	Yes	Yes
Male narrator	Yes	No	No
Number of key safety messages	35	34	38
Video duration (minutes. seconds)	2.55	3.39	4.27

The movie-themed pre-flight safety video (video C) is set in the theme of a popular movie series and uses appropriately dressed individuals to both convey safety messages and feature in the video. The video delivers the same key safety messages as in the other two safety videos, but with additional information specific to the aircraft and its configuration (i.e., location of lifejackets) such as Business Premier. The total duration of this video is 4 minutes and 27 seconds (see Table 5).

The experimental equipment comprised an IBM-compatible personal computer, an NEC (PA550W) data projector, a 2 x 3-metre projector screen and two Bose speakers for presenting each video. Statistical Package for the Social Sciences (SPSS) version 21 was used to analyse all data.

Data reduction. The present research had two aims. First, to investigate if the pre-flight safety briefing provided by airlines prior to a commercial flight was effective in manipulating individuals' mood. Hence, participants' mood was assessed using Shacham's (1983) TMD score, extracted from the POMS-SF questionnaire. The formula for the TMD was: Depression–Dejection + Tension–Anxiety + Anger–Hostility + Fatigue–Inertia + Confusion–Bewilderment + (24 – Vigour–Activity). Second, the present research sought to examine the extent to which individuals could recall the key safety messages in the safety videos. In relation to the second aim, namely examining participants‟ recall of key safety messages, number of key safety messages recalled was represented as a percentage of the total number of safety messages in each briefing. However, prior to being able to calculate this, in line with the research conducted by Tehrani and Molesworth (2015), the number of key safety messages present in each safety video had to be extracted. The process to achieve this involved writing out each script from the respective video, extracting key safety messages, and categorising the safety messages. To ensure consistency and accuracy of coding, two coders independently extracted the key safety messages from each video. Consensus was achieved and a final list of key safety messages was produced for each safety briefing video. These lists were employed by the coders, who scored all responses independently. Any discrepancies were discussed until consensus was achieved, thereby achieving an inter-rater reliability of 100%. Finally, in order to reduce the likelihood of prior exposure to the pre-flight safety video adversely influencing the results, data from only the participants who had not seen their respective pre-flight safety video was analysed; 10 participants (#s 4, 5, 56, 57, 58, 63, 64, 68, 72 and 78; two from video group B, eight from video group C) had previously seen the respective pre-flight safety video and hence were removed from the study.

Procedure. All participants were recruited by direct invitation from selected lecture theatres at the UNSW and randomly divided into three groups. After a short introduction they were asked to complete the consent form, followed by the POMS-SF questionnaire. Then each randomly selected group was asked to watch their respective pre-flight safety briefing video. Directly following the video, they were asked to complete a second POMS-SF, followed by the comprehension task and finally the demographics questionnaire. The average time taken to complete the study per group was approximately 25 minutes.

6.2. Results

Mood scores. Prior to the main analysis, it was important to determine that the random allocation of participants to three experimental groups was successful. As a result, participants' mood score (i.e., TMD score) prior to watching the pre-flight safety video for the three groups (standard video, humorous video, movie-themed video), was analysed with a one-way analysis of variance (ANOVA). As shown in Table 6, with test assumptions of normality and homogeneity of variance satisfactory, the results revealed no statistically significant difference between groups ($F[2, 66] = 1.376$, $p = .260$). This result suggests that the three groups of participants had similar mood prior to the experimental condition.

Having established that participants' mood was consistent across groups, the next analysis was to determine if participants' mood changed as a result of exposure to the various videos. Hence, a second ANOVA was conducted comparing mood scores between groups. With test assumptions of normality and homogeneity of variance satisfactory, the results revealed a statistically significant difference between groups ($F[2,66] = 7.469$, $p = .001$). In order to determine where the differences lay, three separate repeated measures tests were performed, comparing TMD scores prior to the video with TMD scores after the video. With alpha adjusted to .017 to control for family-wise error (i.e., Bonferroni adjusted; $\alpha = 0.05/3$ when three analyses were performed), the result of the first repeated measures analysis comparing TMD scores before and after Standard video (video A) failed to reveal a statistical difference ($t[24] = .911$, $p = .372$). Hence, the mood of participants in the standard video group did not change significantly. In contrast, a significant difference was noted between TMD scores before and after video B ($t[25] = 2.652$, $p = .014$), as well as for participants who watched video C ($t[20] = 3.546$, $p = .002$). A lower TMD score indicates a more positive mood, hence this suggests that both the humorous video and the movie-themed video were effective in improving participants' mood (see Table 6).

Table 6. Total mood disturbance score before and after safety video exposure for each experimental group

	TMD Prior		TMD Post	
Group (n)	Mean	SD	Mean	SD
A - Standard video (27)	26.02	2.14	26.43	3.11
B – Disco video (25)	26.12	3.32	24.64	2.45
C – Hobbit video (20)	24.98	1.48	23.52	1.72

Note: n = participants in each group

In order to determine if prior viewing experience influenced participants' mood following the video (in particular with video C, since there are to date five movies which relate to the content of the pre-flight safety briefing video), a correlational analysis examining exposure to the five movies (i.e., the number of videos participants had seen from this series) and mood following the pre-flight briefing video C was conducted. The results of a Pearson product-moment correlation failed to reveal a relationship between prior video viewing and mood after pre-flight safety video C (r[20] = -.392, p = .088). This result suggests that prior exposure to the five movies had no noticeable effect on participants' mood.

Information recall. In order to determine if participants' ability to recall the key safety messages in each pre-flight safety video differed following each mood manipulation, a one-way ANOVA was conducted to compare the mean number of key safety messages recalled for the three groups (standard, humorous, movie-themed) was analysed (see Table 7). With test assumptions of normality and homogeneity of variance satisfactory, the result revealed a statistically significant difference between groups (F[2, 69] = 17.13, p < .001). Fisher's least significant difference (LSD) post hoc comparisons revealed the significant difference lay between the standard video (video A) and the humorous video (video B; MDiff = 17.54, p < .001) and between the standard video (video A) and movie-themed video (video C; MDiff = 13.30, p < .001). As can be seen in Table 7, this result suggests that the use of humour in a pre-flight safety video or the use of movie themes are not effective methods of facilitating recall of information compared to a pre-flight safety briefing video without humour or movie themes.

Table 7. Recall of key safety messages – performance across groups

Group (n)	Mean % (SD)	Range (Min–Max)
A -Standard video (27)	54.70 (9.29)	38.00–74.00
B – Humorous video (25)	37.16 (10.46)	21.00–59.00
C – Movie Theme video (20)	41.40 (14.27)	8.00–71.00

Note: n = participants in each group

Since the content of safety briefings are mandated by aviation safety authorities and are standardised, and 75 participants noted that they had flown on a commercial aircraft at least once in the last five years, it was anticipated that study participants who had flown previously would have better knowledge of the content of safety briefings and so be likely to recall more items in this study. In order to investigate this, a series of correlation analysis was performed. The results failed to find a relationship between prior flight experience (number of flights in last year or five years) and safety information recall (largest r: $r[69] = .060$, $p = .622$).

6.3. Discussion

The results of the present research suggest that the pre-flight safety briefing video can be used as a tool to manipulate passengers' mood. Moreover, providing participants with an entertaining safety video that is either comical or familiar to them serves as a method of enhancing their mood. In contrast, providing a video that is void of humour or entertainment value fails to positively influence mood. However, there appears to be a trade-off between entertainment and education. Specifically, the results of this research suggest that the greater the entertainment value, the poorer the retention of key safety messages. For many airlines, this result would be disappointing, as it fails to reward their efforts to be creative and re-engage passengers with crucial safety-related information (and in some cases, marketing). The results of the present research suggest that airlines should pay careful attention to the design of pre-flight safety briefings to not only capture passengers' attention, but heighten recall of the key safety messages intended to be conveyed. Similarly, for passengers, this result appears disappointing as such videos appear to directly address the complaints as to the reasons why they fail to attend to such information (e.g. repetitive, familiar with content, boring).

Moreover, the results of the present research indicate that passengers' retention of information following exposure to safety briefing information is poor at best. Molesworth

(2013) found that on average participants could recall approximately half of the key safety messages presented in the safety videos. The results of the present research found that recall rates were slightly lower, averaging 44%. Nevertheless, the data indicated that 92% of participants who watched the Disco video failed to remember how to obtain more safety information (i.e., referring to the safety card located in the seat pocket) and 52% did not recall the location of emergency exits and how to calculate the distance (i.e., counting the number of seats) to the nearest one. Also, 44% (11 participants) of the Disco video viewers did not recall the safety briefing covering the upright seating position during take-off and landing. Furthermore, 20% of these participants forgot the brace position requirement and the no smoking requirement and 12% did not retain information about their lifejacket's location and its operation.

The Hobbit video (movie-themed) viewers also failed to retain important safety information. For example, 39% failed to recall emergency exits, 17% failed to recall the existence of emergency lighting, 14% failed to recall the brace position and non-smoking rules, and 10% failed to recall the location of the lifejacket, the seat belt and the seat position for take-off and landing.

The standard video watchers performed significantly better than the other two groups. Only 14% failed to recall the emergency lighting and 10% or below did not recall the safety information regarding seat position, use of electronic devices, exit doors and the no smoking policy. These results are alarming, and suggest that the aviation industry needs to rethink its strategies of passenger education and develop new methods of delivering safety information, so that it is more memorable.

The results also highlight the complex relationship between mood and performance. For example, Experiment 1 found participants in a positive mood performed better during the simulated emergency evacuation than participants in a negative mood state, in terms of time to complete the evacuation as well as number of errors committed. The results of the present research suggest that improved mood due to a humorous safety video could adversely affect recall of key safety messages. This is despite the script employed to deliver the key safety messages in each video being largely the same.

Various factors may account for these results; the most notable relates to the cognitive processing of the information in the safety videos. Specifically, in both the humorous and movie-themed videos, additional stimuli required to set the theme of each video (i.e., attire and humour) is present; such stimuli has the potential to increase cognitive load and/or disrupt the cognitive processing of safety messages. Similarly, flying or the thought of flying may increase an individual’s anxiety level (Busscher, Spinhoven, Gerwen, & Geus, 2013) or conversely reduce anxiety (i.e., low level of arousal) in the case of a frequent flyer. In both situations, experiencing less than optimum levels of stress or arousal can hinder passengers’ ability to acquire important safety information.

The primary focus of aviation governing bodies such as the FAA in the United States, Transport Canada and CASA in Australia is to enhance safety by setting regulations for their local carriers (Chen & Chen, 2012). For airlines this translates into rules, procedures and systems to either eliminate or reduce the likely impact of hazards on their operation (i.e., manage risk). For passengers of these airlines, one obvious risk control measure is the pre-flight safety briefing provided prior to the flight to educate them about the safety features of the aircraft they are flying with and how to behave in the unexpected event of an emergency. However, many passengers regard the pre-flight safety briefing as repetitive, familiar (i.e., old information) and/or boring (Fennell & Muir, 1992; Seneviratne & Molesworth, 2015). The benefit of positively influencing passengers’ mood would be evident in situations such as the

US Airways (Flight 1549) accident in 2009, which involved an in-flight emergency shortly after take-off where cabin crew were left with little time to prepare the cabin for emergency evacuation (NTSB, 2010).

Batra and Stayman (1990) found a similar effect with humour in advertising: it secured attention but disrupted processing of the key messages. It is thought that this results from the participant paying close attention to the humorous part of the message (or advertisement) at the expense of the message about the product (Chan, 2011). The disrupted process and its consequential effects, such as reduced cognitive function (reduced speed of recall), is similar to poor performance in exams because of stress. Eysenck (1979) noted that people perform poorly in exams because of stress and anxiety due to worriedness; unlike arousal, worriedness slows down memory and other responses. Future researchers should investigate the link between mood and information processing and examine other techniques to manipulate mood. Humour, while it attracts attention, has the potential to increase cognitive load and mask the key messages being delivered (in this case, flight safety). Researchers could examine stimuli such as colours (Yildirim et al., 2007), music (Young, Mitsopoulos-Rubens, Rudin-Brown, & Lenne, 2012), pictures or motivational methods (Richards & Whittaker, 1990) such as prizes to determine if recall performance is the result of the positive mood itself or the method with which the mood is attained.

Future research should also examine response accuracy decrements over time. The present research focused on examining participants' recall performance directly following exposure to a pre-flight safety briefing. However an emergency may occur at any time during a flight, requiring passengers to recall and apply knowledge acquired from the pre-flight safety briefing they were exposed to at the start of the flight. One simple and effective method of examining response accuracy decrements over time is to pair the recall point with key segments of flight, such as take-off, climb, cruise, top of descent, and landing, given that recall of safety information is unlikely to improve with increasing time since the pre-flight safety briefing.

Whilst participants' mood in Experiment 2 was successfully manipulated as a result of exposure to the different pre-flight safety briefing videos (a standard video, celebrities video and a humorous video or a movie-themed video), it is possible that the differences observed in recall performance were affected by the videos as well as the mood. Hence, future research needs to investigate the effect of the visual information contained within the videos on participants' information recall. Furthermore, future researchers should investigate how contextual factors such as the environment of an aircraft (e.g. noise and seating position) and visual acuity affect individuals' recall of the safety messages, as well as mood. Future studies need to examine means of attracting passengers' attention to the main points of the pre-flight safety briefing and attempt to find how to maintain the safety information value. It is important to note that the quality of the videos employed in the present research along with the respective audio were of high quality. Considering these factors have been reported before as key determinants as to why passengers fail to attend to pre-flight safety briefings (Fennell & Muir, 1992), future researchers, studying new strategies should also examine their impact on retention of information from briefings. In addition, future research should attempt to duplicate the findings presented herein with a more diverse range of participants, since the average age of the participants in the present study was approximately 20 years.

6.4. Conclusion

The results of this research show that safety briefings can enhance mood, but the material used to improve mood can have detrimental effects on recall of essential information. The results show that briefing methods that enhance mood may not enhance memory.

As required by law, airlines give all passengers a safety briefing prior to every flight. Many passengers view this briefing as repetitious and boring; this has led some airlines to transform their briefings, making them more humorous and entertaining. Humour has many benefits, one of which is positively affecting mood, which should lift performance (i.e., reduce errors and time to complete task). However, the results of the present research suggest that there exists a trade-off between the entertainment value of a pre-flight safety briefing using humour and education and safety information retention. These results suggest that pre-flight safety briefings must be redesigned so they capture and maintain the attention of passengers and at the same time maximise comprehension and retention of the key safety messages they contain in the safety briefing.

Chapter 7: Experiment 3 – Effect of Rewards on Performance in Non-Normal Situations

The results of Experiment 1 revealed that mood and performance in a similar way to routine situations, are directly correlated in emergency conditions. That is when any delays for example, during an emergency evacuation (i.e., due to the rare events of smoke or fire), can increase the risk of serious or fatal injuries. As many airline passengers partially or completely undermine or are reluctant to attend the importance of vital safety information contained in the pre-flight safety briefings prior to flights, some airlines are employing celebrities, movie stars or use humour in videos to deliver safety messages in order to attract passengers' attention and enhance their mood. The pre-flight safety briefing is deemed to be a unique opportunity for the airlines to educate passengers for the unlikely events, as safety knowledge can increase their survival rate and a possibility to influence their mood positively, in order to improve their performance during an emergency.

Experiment 2 examined whether the pre-flight safety briefing could be used to improve passengers' mood and how the delivery of safety information using humour or movie themes can affect the retention of key safety messages. As mentioned previously, Molesworth (2014) states that airline passengers cannot remember more than 50% of safety messages contained in the pre-flight safety briefing, which explains why many passengers behave contrary to the instructions given during emergencies. The present study sought to examine if a reward system could improve passengers' mood and retention of the safety messages contained in the pre-flight safety briefing. In order to reach that conclusion, it was necessary to determine if passengers' mood was affected by a reward. The study also sought to explore if a reward system could be utilised exclusively as a motivational tool for remembering the safety messages contained in the pre-flight safety briefing. More specifically, this study sought to examine the following questions:

1. Could a reward system enhance passengers' mood and motivate them to pay more attention to the pre-flight safety briefing?
2. Could a reward system influence passengers' memory to retain the safety information?

Finally, it was hypothesised that a statement prior to the pre-flight safety demonstration, offering rewards for recalling safety messages, would improve passengers' mood and motivate them to pay more attention to the safety briefings.

7.1 Method

Participants. Fifty-three participants (25 male, average age 28.94 years and 28 females, average age 25.22 years) with an overall average age of 27.32 (SD = 14.07) years were recruited from student and staff population at the University of Southern Queensland (USQ), Australia, using Flyers and sending Emails to staff and students for the research. All students and staff volunteered their time. The researcher informed the reward group that they could win $100 gift voucher from the Target store if they could answer all of the main safety messages correctly. Most participants were reimbursed with a $10 bookshop gift voucher for their time, but staff participants refused reimbursement. The research was approved in advance by the USQ Ethics Panel (refer to Appendix C).

Design. A 2 x 2 mixed repeated measures design with mood comprising two levels (mood before and after a pre-flight safety video presentation) as the repeated measure variable and the pre-flight safety briefing video as between the 2 groups of control group and the reward group was employed. The TMD (Shacham, 1983) was one dependent variable and recall (the number of items remembered from the safety video) was the second variable. A motivational trait questionnaire (MTQ) was used to measure each groups' motivation as if there was a correlation between their motivation and remembrance. Some analytical assessments were made to determine participants' demographic links such as age, gender, native language, and their flying experience, either as passenger or pilot and safety information recall items from the pre-flight safety briefings.

Material. For consistency and reliability, the materials utilised in this research were identical to those used in study 2: a demographic form to identify participants' age, gender and flying experience; a consent form; an information sheet describing the study; a POMS-SF (Shacham, 1983); a standard pre-flight safety video; and a comprehension test form (see Table 4).

Data reduction. It was essential to ensure that participants had not been previously exposed to the pre-flight safety video presented for the experiment. As none of the participants had seen the video, no data reduction was implemented for this experiment.

Procedure. Fifty-three students and staff (37 students and 16 staff) from USQ participated in the experiment. Participants were randomised into two groups – a control group (n = 27) and a reward group (n = 26). Although both groups were exposed to an identical pre-flight safety briefing and were given the same questionnaires, the experiment had to be conducted separately as the participants in the control group were not offered any rewards, while the reward group was told at the onset of the experiment that they would be rewarded if they remembered all of the key safety information from the pre-flight video. After a short introduction, participants were asked to fill in a consent form followed by a demographics questionnaire to identify their age, gender, and number of years they had been speaking English. Then, participants were asked to fill in an MTQ and POMS-SF and watch a standard pre-flight safety video (produced by Air New Zealand). Upon completion of the video, participants were asked to record their recollections in a preformatted form identical to that used in Experiment

2. Finally, participants were asked to fill in a second POMS-SF. The mean time taken to complete the experiment was about 30 minutes per group.

7.2. Results

Mood Scores. It was expected that the control group's mood would not differ throughout the experiment. This was due to lack of any incentives such as offering a reward. Through an independent *t* test (paired sample), the mean TMD of the control group prior to observation of the pre-flight safety video (time 1) was compared with the mean TMD after watching the safety video (time 2). The results were in line with the study's hypothesis: mean TMD prior to video observation was 24.68 and 24.66 after watching video (mood was not changed). However, the reward group numerically showed a reduced mood (mean TMD prior to video observation was 25.23 and 26.41after watching video) after watching the pre-flight safety video (Table 8).

Table 8. TMD scores before and after safety video exposure for both groups

	TMD, time 1		TMD, time 2	
Group (n)	Mean	SD	Mean	SD
Control (27)	24.68	2.78	24.66	2.70
Reward (26)	25.23	2.23	26.41	2.49

Note: n = participants in each group

The TMD of the reward group was lower at time 1 than time 2, but this difference was not statistically significant (p = .421) (Table 9). Note that as the TMD increases, mood deteriorates, in accordance with the TMD formula (TMD = Anger + Confusion + Depression + Fatigue + Tension + (24 - Vigour)). The next step was to determine the factor(s) which had led to the above outcome. This difference was statistically significant t (51) = (-1.76, p = .018 (2 tailed)).(Table 9).

Table 9. Independent Samples t *test*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig.(2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
TMD before watching safety video (More TMD = Reduced Mood)	Equal variances assumed	147	.703	.812	51	.421	.549	.676	1.91	.81
	Equal variances not assumed			.815	50.06	.419	.549	.674	1.90	.80
TMD after watching safety video (More TMD = Reduced Mood)	Equal variances assumed	553	.461	2.45	1	.018	1.756	.715	3.19	.32
	Equal variances not assumed			2.45	0.91	.017	-1.756	.714	3.18	.32

As the results conflicted with the predicted outcome, a subsequent assessment was designed in which the reward group was divided into two sub-groups – staff (n = 9), average age 47.22 years, and students (n = 17), average age 19.06 years. The assessment began with a repeated measures Analysis of Variance (ANOVA) to determine if the participants' TMD profiles differed according to whether they were staff members or students.

7.2.1. Staff/student status and mood

The staff's TMD did not change significantly as a result of the experiment; however, students' mood deteriorated – mean TMD increased significantly (Table 10).

Table 10. Descriptive Statistics – Staff and Student mood change

	Staff/Student	Mean	SD	N
TMD before watching safety video (More TMD = Reduced Mood)	Staff	25.39	2.97	9
	Student	25.14	1.83	17
	Total	25.23	2.23	26
TMD after watching safety video (More TMD = Reduced Mood)	Staff	25.77	2.41	9
	Student	26.77	2.54	17
	Total	26.42	2.50	26

According to Box's test of equality of covariance matrices (Table 11), at least one of the assumptions was violated and covariance matrices of the dependent variables were not equal across groups (p =.049<.05).

Table 11. Box's test of equality of covariance matrices

Box's M	8.769
F	2.614
df1	3
df2	6491.270
Sig.	.049

Although, the combination of time and Position (Staff & Student) by Greenhouse-Geisser test (Table 12) had no significant interaction effect on mood (p = .174>.05), the TMD changes over time were statistically significant (p = .034 < .05).

Table 12. Tests of within-subjects - Position (Staff & Student) interaction with mood

Source		Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	11.785	1	11.785	5.075	.034	.175
	Greenhouse-Geisser	11.785	1.000	11.785	5.075	.034	.175
	Huynh-Feldt	11.785	1.000	11.785	5.075	.034	.175
	Lower-bound	11.785	1.000	11.785	5.075	.034	.175
Time * Position	Sphericity Assumed	4.566	1	4.566	1.966	.174	.076
	Greenhouse-Geisser	4.566	1.000	4.566	1.966	.174	.076
	Huynh-Feldt	4.566	1.000	4.566	1.966	.174	.076
	Lower-bound	4.566	1.000	4.566	1.966	.174	.076
Error(Time)	Sphericity Assumed	55.733	24	2.322			
	Greenhouse-Geisser	55.733	24.000	2.322			
	Huynh-Feldt	55.733	24.000	2.322			
	Lower-bound	55.733	24.000	2.322			

Similarly, Mood was affected by Time. The significance of difference in TMD between time 1 and 2 is shown in the pairwise comparisons table (Table 13).

Table 13. Pairwise Comparisons Measure: TMD changes between time 1 and 2

					95% Confidence Interval for Difference	
(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
1	2	-1.001*	.444	.034	-1.917	-.084
2	1	1.001*	.444	.034	.084	1.917

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Bonferroni.

An overall assessment of staff and student's position and their effect on mood shows a statistically significant increase in TMD between time 1 and 2 for each group (a sharper increase for the students – Figure 13)

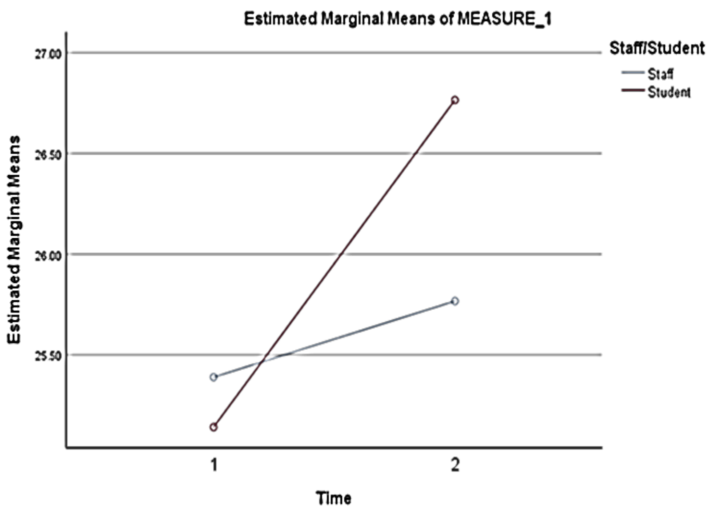

Figure 13. Student/Staff vs Mood over time

7.2.2. Gender and mood

Another consideration for the mood deterioration of the reward group was to analyse the effect of Gender on Mood (see Table 14).

Table 14. Descriptive Statistics – Effect of Gender on Mood

	Gender	Mean	Std. Deviation	N
TMD before watching safety video (More TMD = Reduced Mood)	Male	26.1000	1.94122	13
	Female	24.3538	2.22771	13
	Total	25.2269	2.23241	26
TMD after watching safety video (More TMD = Reduced Mood)	Male	26.9231	2.11075	13
	Female	25.9154	2.82160	13
	Total	26.4192	2.49480	26

Since Box's test of equality of covariance matrices and Levene's test of equality of error variances showed that none of the assumptions were violated and covariance matrices of the dependent variables were equal across groups, the effect of time was extracted from Wilks' lambda test of multivariate tests (Table 15), which showed the interaction between Time and Gender had no significant effect on Mood (p = .40>.05). However, Mood was significantly affected by time (p = 01< .05).

Table 15. Multivariate Tests[a] – Effect of Gender and Time on Mood

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.240	7.578[b]	1.000	24.000	.011	.240
	Wilks' Lambda	.760	7.578[b]	1.000	24.000	.011	.240
	Hotelling's Trace	.316	7.578[b]	1.000	24.000	.011	.240
	Roy's Largest Root	.316	7.578[b]	1.000	24.000	.011	.240
Time * Gender	Pillai's Trace	.029	.727[b]	1.000	24.000	.402	.029
	Wilks' Lambda	.971	.727[b]	1.000	24.000	.402	.029
	Hotelling's Trace	.030	.727[b]	1.000	24.000	.402	.029
	Roy's Largest Root	.030	.727[b]	1.000	24.000	.402	.029

a. design: intercept + gender within subjects design: time

b. exact statistic

Furthermore, a significant deterioration of the female's mood was noted between time 1 and 2 (Table 16). The females' declined mood was statistically significant (p = .02<.05).

Table 16. Pairwise Comparisons Measure: Gender TMD changes per time

Gender	(I) time	(J) time	Mean Difference (J)	Std. Error	Sig.^{b}	95% Confidence Interval for Difference ^{b} Lower Bound	Upper Bound
Male	1	2	-.823	.613	.192	-2.087	.441
	2	1	.823	.613	.192	-.441	2.087
Female	1	2	-1.562*	.613	.018	-2.826	-.297
	2	1	1.562*	.613	.018	.297	2.826

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

Pairwise comparison (Table 17) shows that the mood difference between male and female prior to watching the safety video was statistically significant (p = .04 <0.5).

Table 17. Pairwise Comparisons Measure: TMD changes over time

time	(I) Gender	(J) Gender	Mean Difference (I-J)	Std. Error	Sig.^{b}	95% Confidence Interval for Difference Lower Bound	Upper Bound
1	Male	Female	1.746*	.820	.044	.055	3.438
	Female	Male	-1.746*	.820	.044	-3.438	-.055
2	Male	Female	1.008	.977	.313	-1.009	3.025
	Female	Male	-1.008	.977	.313	-3.025	1.009

Based on estimated marginal means
*. The mean difference is significant at the .05 level
b. Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

In summary, analysis of the effect of gender on mood reveals that despite obvious difference between each group's mood, females had a lower mean TMD (were happier than males) at time 1(before watching safety video), and their TMD rose more sharply than males' (lost their happiness with a greater rate) to time 2 (after watching the safety video). Hence, female's mood change (deterioration) over time was statistically significant. Although the male population's mood also declined on average between time 1 and time 2, this was not statistically significant (Figure 14).

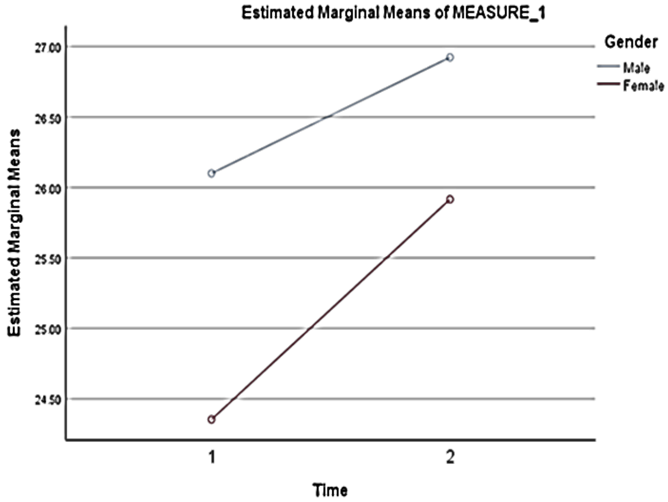

Figure 14. Gender vs Mood over time

7.2.3. Reward/prize and mood

Since the correlation between mood and rewards was the core issue of this study, it was necessary to undertake a more stringent assessment of the relationship. The reward group was divided into two subgroups: the participants who were in favour of the rewards – the Yes group (n = 16), and those who did not see themselves as rewards centric – the No group (n = 10).

The Yes group's TMD increased between time 1 and time 2, indicating some mood deterioration (Table 18). The No group showed little change in TMD.

Table 18. Descriptive statistics – Change of mood (TMD) for the reward subgroups (Yes and No) groups

	Reward/Prize Centric	Mean	SD	n
TMD before watching safety video (More TMD = Reduced Mood)	Yes	25.29	2.14	16
	No	25.13	2.48	10
	Total	25.23	2.23	26
	Yes	26.84	2.50	16

TMD after watching safety video (More TMD = Reduced Mood)	No	25.74	2.46	10
	Total	26.42	2.49	26

Box's test of equality of covariance matrices (Table 19) revealed that at least one of the assumptions was violated and covariance matrices of the dependent variables were not equal across groups (p =.026<.05).

Table 19. Box's Test of Equality of Covariance Matrices

Box's M	10.256
F	3.082
df1	3
df2	13418.035
Sig.	.026

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups

a. Design: Intercept + Rew_Prize Within Subjects Design: Time

According to the Greenhouse-Geisser test, the interaction effect of time and Reward/Prize had no significant effect on Mood (Table 20). However, in line with earlier assessments of gender and position, Time had a significant effect on Mood (p = .022 < .05).

Tests of between-subjects effects (Table 20) support the notion that Reward/Prize as an individual factor had no significant effect on mood. Simultaneously, they showed that the difference between the Yes and No groups' mood was not significantly related to Reward/Prize, but was only affected by time.

Table 20. Tests of within-subjects effects, measure 1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	14.439	1	14.439	6.022	.022	.201
	Greenhouse-Geisser	14.439	1.000	14.439	6.022	.022	.201
	Huynh-Feldt	14.439	1.000	14.439	6.022	.022	.201
	Lower-bound	14.439	1.000	14.439	6.022	.022	.201
Time *Rew_Prize	Sphericity Assumed	2.755	1	2.755	1.149	.294	.046
	Greenhouse-Geisser	2.755	1.000	2.755	1.149	.294	.046
	Huynh-Feldt	2.755	1.000	2.755	1.149	.294	.046
	Lower-bound	2.755	1.000	2.755	1.149	.294	.046
Error(Time)	Sphericity Assumed	57.544	24	2.398			
	Greenhouse-Geisser	57.544	24.000	2.398			
	Huynh-Feldt	57.544	24.000	2.398			
	Lower-bound	57.544	24.000	2.398			

Assessment of mood in the Yes and No groups showed a declined mood from time 1 to 2 for each group, with sharper deterioration for the Yes group; the increase in TMD (i.e., decline in mood) is statistically significant ($p = .02$). The profile shows that both groups' moods were not significantly different at time 1(Figure 15).

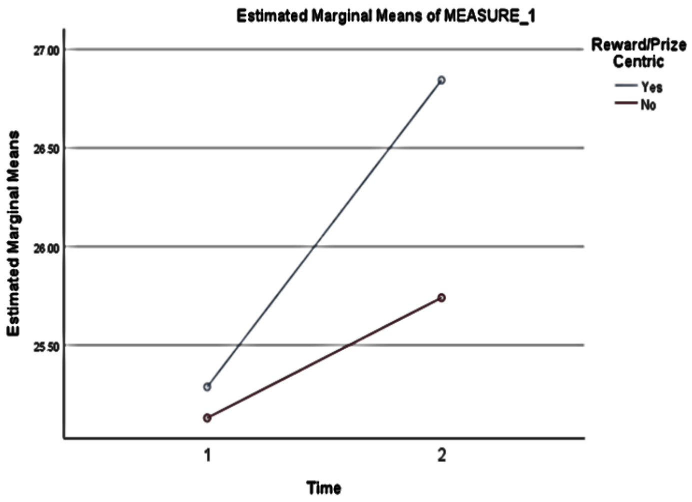

Figure 15. Yes and No groups vs Mood over time

In order to determine why mood deteriorated, further analyses were undertaken by examining the elements of the TMD formula. Recall that TMD = Anger + Confusion + Depression + Fatigue + Tension + (24 - Vigour). Each of those factors was assessed separately against Gender, Position (staff or student) and Reward/Prize factors, employing a mixed repeated measures ANOVA to highlight the most influential factor/s which had caused mood to deteriorate.

7.2.4. Anger and Gender

Box's test suggested that the data violated at least one of the assumptions and did not satisfy the assumption that the observed covariance matrices of the Anger were equal across groups (p =.040<.05). Table 21, showing results from Levene's test at time 1(p = 0.147), the assumption that the error variance of Anger is equal between Male and Female but does not satisfy at time 2 (p = .005).

Table 21. Levene's Test of Equality of Error Variances a

	Levene Statistic		df1	df2	Sig.
Anger Before	based on mean	2.246	1	24	.147
	based on median	2.647	1	24	.117
	based on median and with adjusted df	2.647	1	20.299	.119
	Based on trimmed mean	2.645	1	24	.117
Anger After	based on mean	9.487	1	24	.005
	based on median	2.075	1	24	.163
	based on median and with adjusted df	2.075	1	15.047	.170
	Based on trimmed mean	7.666	1	24	.011

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a. Design: Intercept + Gender
Within Subjects Design: Time

The interaction effect of Time and Gender was insignificant (p = .058), suggesting change in Anger scores over time for the two groups (male and female). In addition, the significant effect of time in the Greenhouse-Geisser test (p = 0.034) suggests that Anger differed significantly over time. Pairwise comparisons revealed that at time 1, the average Anger score for male was higher than female but the difference was not significant scores (M = .392, Table 22); however, female Anger scores significantly increased between time 1 and time 2 (p = .006, Table 23).

Table 22. Pairwise comparisons measure: Anger

time	(I) Gender	(J) Gender	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	Upper Bound
1	Male	Female	.392	.203	.066	-.027	.812
	Female	Male	-.392	.203	.066	-.812	.027
2	Male	Female	-.085	.268	.754	-.637	.467
	Female	Male	.085	.268	.754	-.467	.637

Based on estimated marginal means
a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table 23. Pairwise Comparisons Measure: Anger

Gender	(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference Lower Bound	Upper Bound
Male	1	2	-.031	.169	.857	-.380	.319
	2	1	.031	.169	.857	-.319	.380
Female	1	2	-.508*	.169	.006	-.857	-.158
	2	1	.508*	.169	.006	.158	.857

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

An overall view of the correlation between gender and anger reveals that the female Anger rise is much higher than male. There is only significant difference within female group's Anger from time 1 to time 2. Although the profile depicts some differences at Time 1, that is statistically insignificant. Likewise, there is no significant difference between the two groups' anger at time 2 (Figure 16).

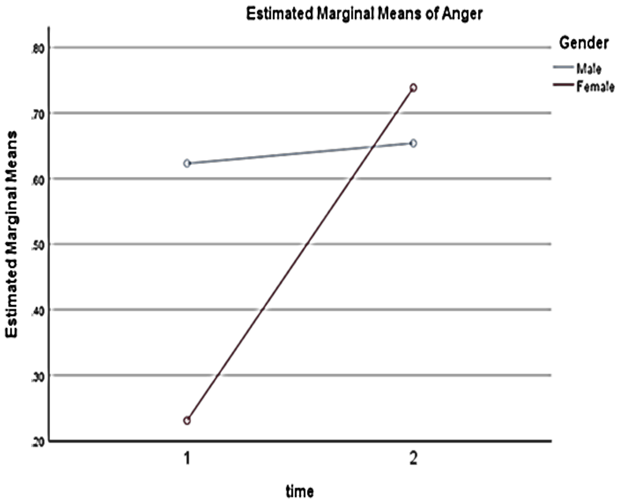

Figure 16. Gender vs Anger over time

7.2.5. Anger and Position (Staff/Student)

Although both groups' Anger (staff and students) increased from time 1 to time 2, the increases were statistically insignificant (Figure 17).

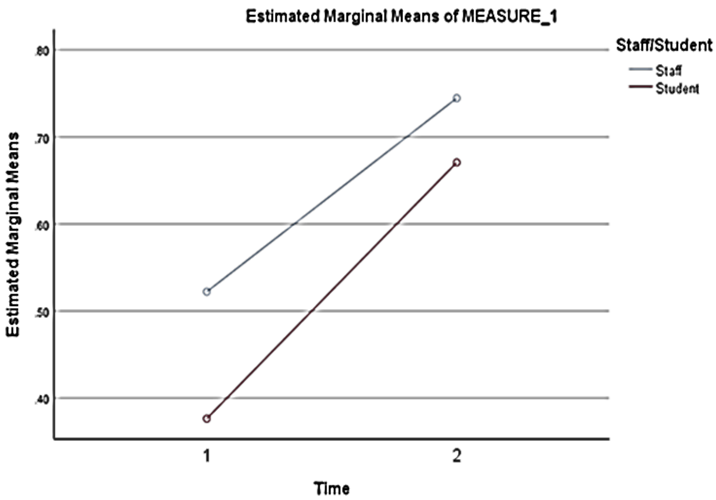

Figure 17. Position (Staff /Student) vs Anger over time

7.2.6. Anger and Reward/Prize (Yes & No)

Pairwise comparison of the two groups (Yes = reward centric and No = non-reward centric) revealed a significant change in Anger for the Yes group from time 1 to time 2 (p = .008 <.05, Table 24), also depicted in Figure 18.

Table 24. Pairwise comparisons measure: Anger

Reward/Prize Centric	(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference [b] Lower Bound	Upper Bound
Yes	1	2	-.444*	.154	.008	-.762	-.125
	2	1	.444*	.154	.008	.125	.762
No	1	2	.010	.195	.960	-.393	.413
	2	1	-.010	.195	.960	-.413	.393

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

The Reward centric group (Yes group) and the non-reward centric group (No group) were compared over time, from before to after watching video (Figure 18)

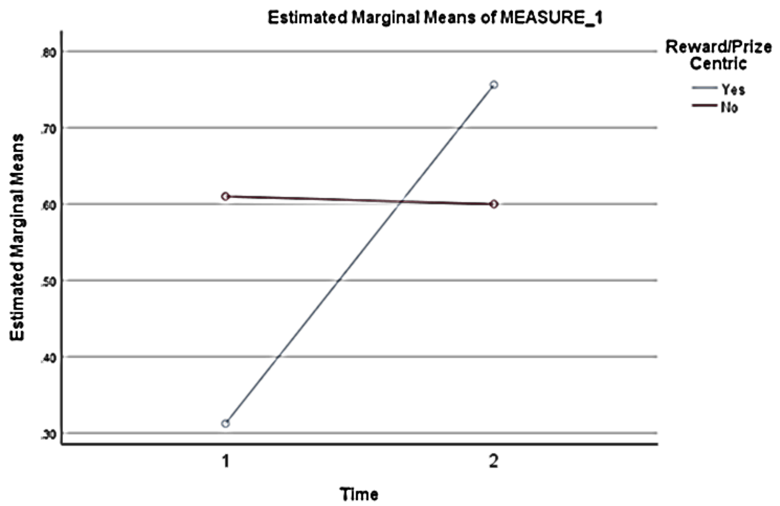

Figure 18. Yes / No group vs Anger over time

7.2.7. Depression and Gender

Despite Figure 19 showing an increase in female's depression over time, the change was not statistically significant. Male depression varied even less from time 1 to time 2.

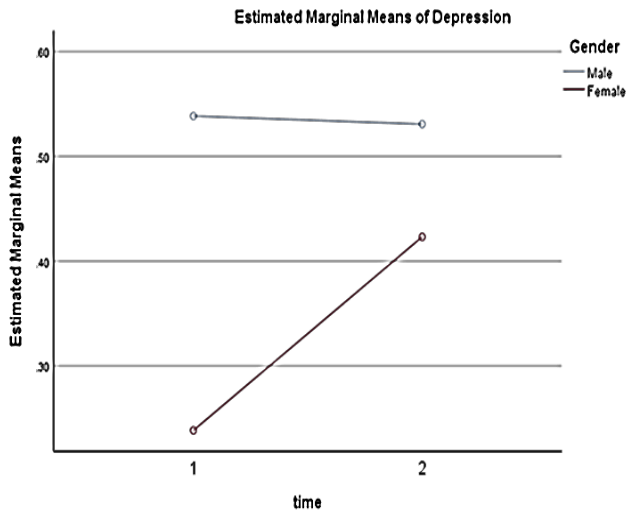

Figure 19. Gender vs Depression over time

7.2.8. Depression and Position (staff or student)

Student's depression at time 1 was higher than that of staff (not significant), and did not change significantly to time 2. Staff member's depression did not change between time 1 and time 2 (Figure 20).

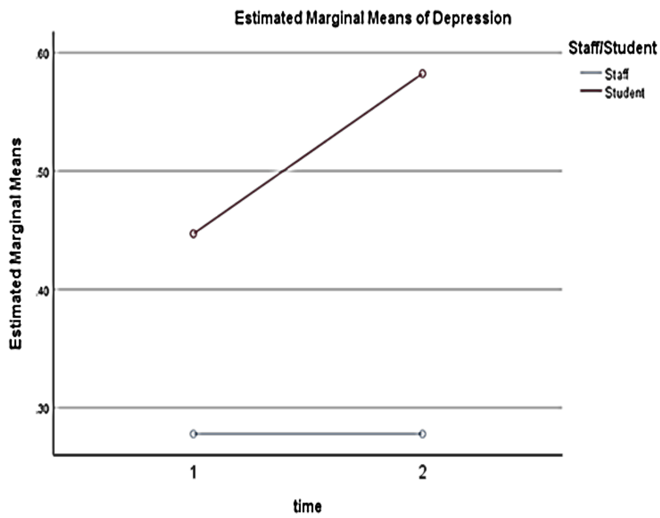

Figure 20. Staff/Student vs Depression over time.

7.2.9. Depression and Reward/Prize

There was no correlation between the two groups (reward centric – the Yes group and non-reward centric – the No group) and depression, and the changes over time were not statistically significant for either group (Figure 21).

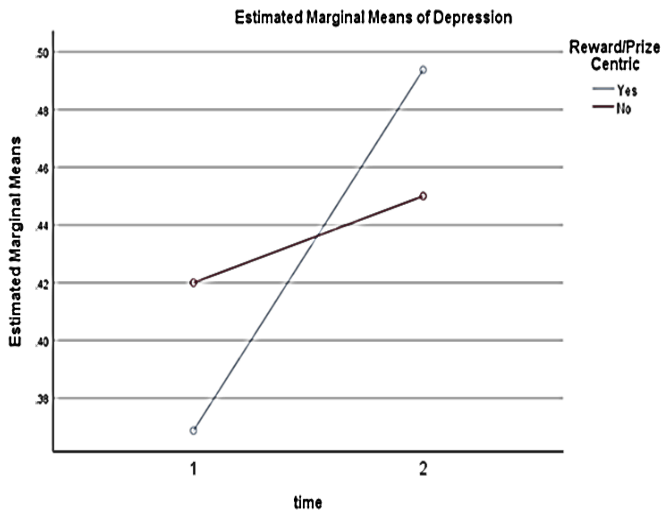

Figure 21. Reward centrism (Yes and No groups) vs Depression over time.

7.2.10. Fatigue and Gender

Male reported higher fatigue scores than female but the mean difference was statistically insignificant (Figure 22).

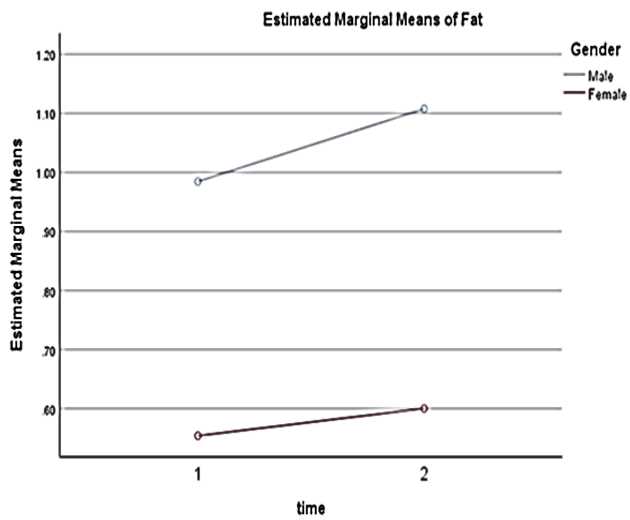

Figure 22. Gender vs Fatigue over time

7.2.11. Fatigue and Position (staff or student)

Even though student's fatigue was increased, the study did not find any correlation between the fatigue and position of the reward group (Figure 23).

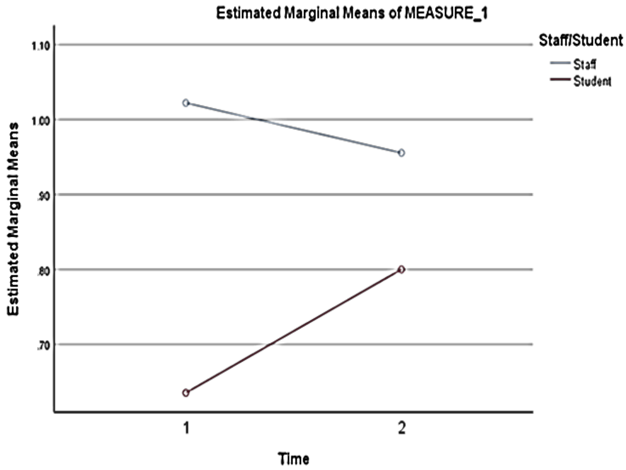

Figure 23. Staff/Student vs Fatigue over time.

7.2.12. Fatigue and Reward/Prize

The changes in fatigue for both Yes and No groups were statistically insignificant. (Figure 24).

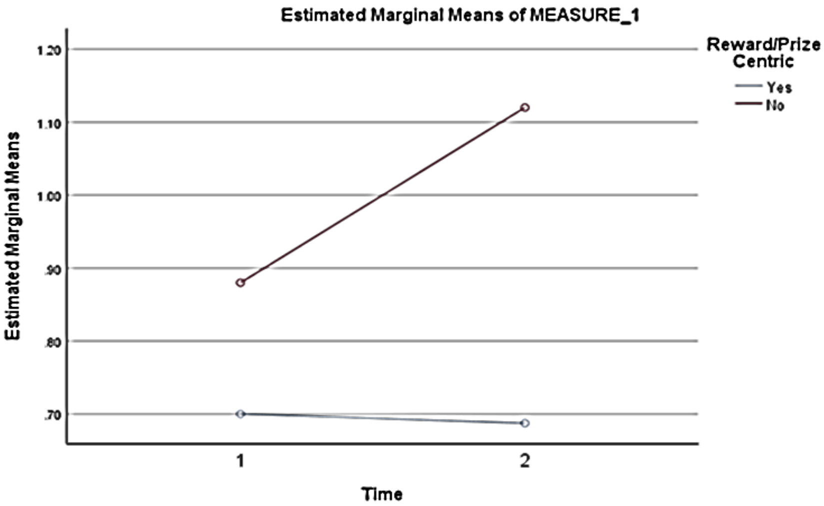

Figure 24. Reward centrism (Yes and No groups) vs Fatigue over time.

7.2.13. Tension and Gender

Statistically, no significant differences in Tension were observed between male and female over time (Figure 25).

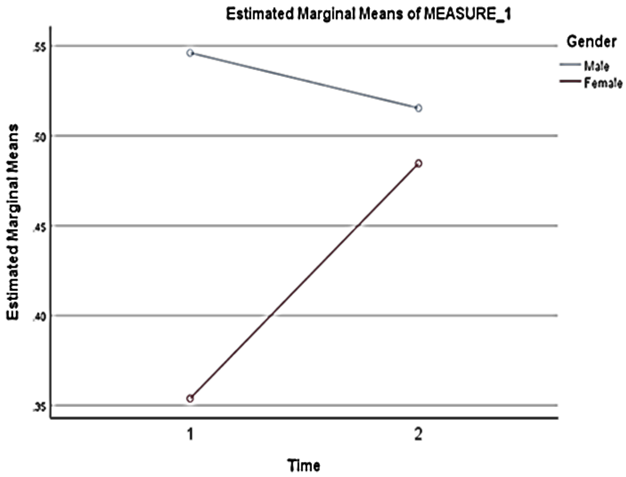

Figure 25. Gender vs Tension over time.

7.2.14. Tension and Position (staff or student)

Student tension was higher than staff at the onset of the experiment – Time 1. While, both groups tension raised slightly to a higher level, student's tension remained higher at the end of experiment – Time 2. The study did not find statistically a significant difference between the two groups' tension (Figure 26)

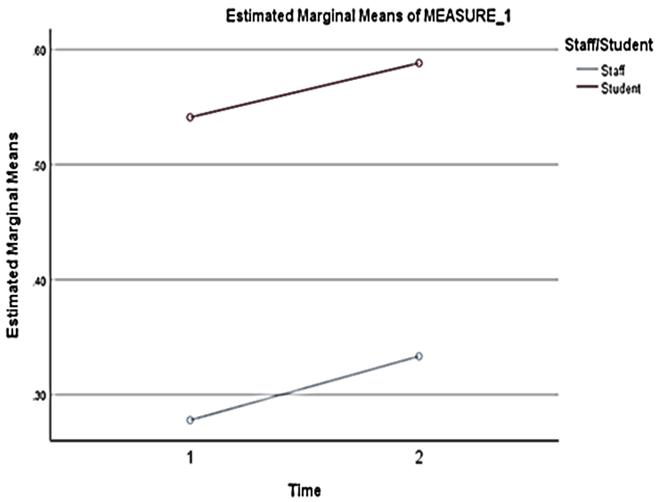

Figure 26. Staff/Student vs Tension over time.

7.2.15. Tension and Reward/Prize

Reward/Prize had no significant effect on Tension; the increase in Tension for the Yes group was statistically insignificant (Figure 27).

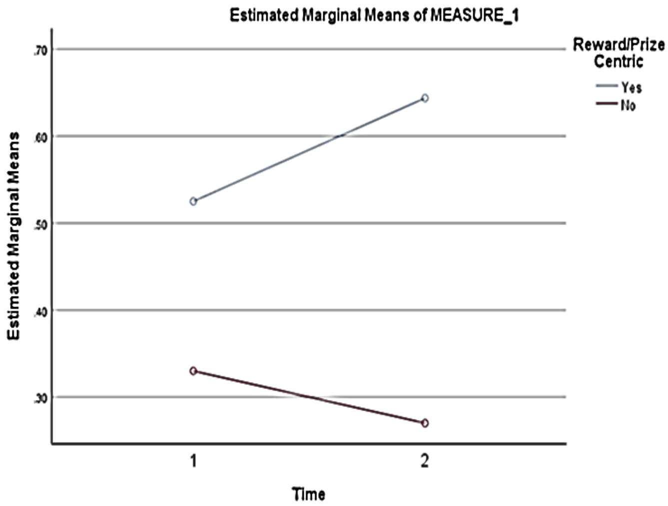

Figure 27. Reward centrism (Yes and No groups) vs Tension over time.

7.2.16. Confusion and Gender

Figure 28 shows that both male and female confusion were increased from time 1 to time 2. Although, the interaction between time and Gender had no significant effect on confusion, but time itself was statistically significant (p = .046< .05). The difference between male or female's confusion by pairwise comparison, at time 1 and at time 2 was insignificant.

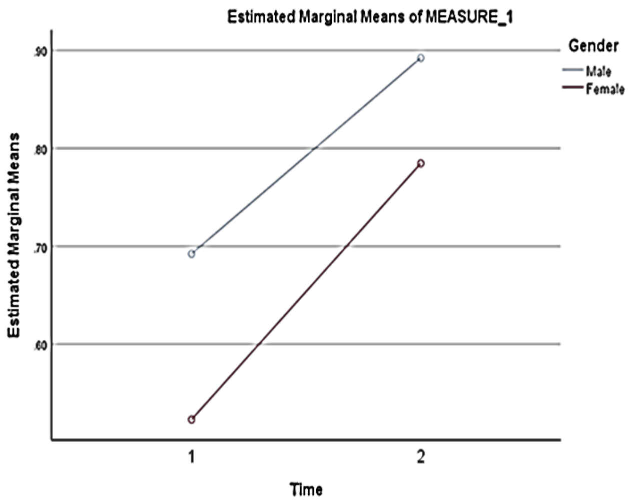

Figure 28. Gender vs Confusion over time.

7.2.17. Confusion and Position

A profile depiction of Figure 29 supports the rise of confusion amongst both groups (Staff and Students). Despite staff members' mean confusion level increased from .53 (SD = .41) to .60 (SD = .57), and students' mean confusion level from .65 (SD = .50) to .96 (SD = .77), The two groups' confusion differences were statistically insignificant, but students' increase in confusion from Time 1 to Time 2 was statistically significant (*p* = .02).

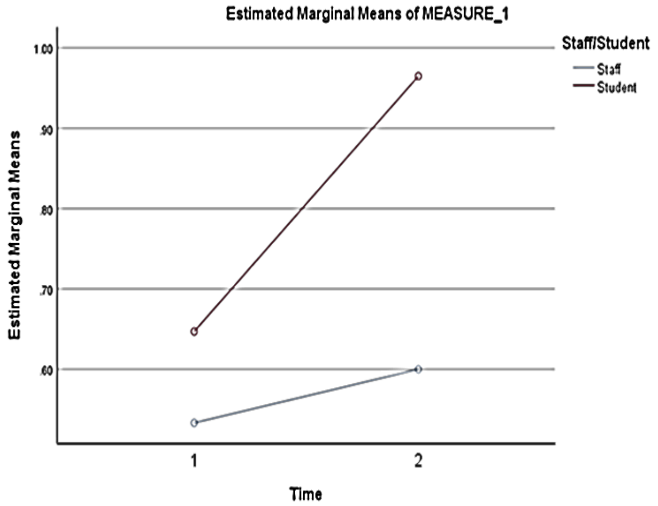

Figure 29. Position (staff/student) vs Confusion over time.

7.2.18. Confusion and Rewards

No significant differences in Confusion were observed between students and staff at either time point or over time (Figure 30).

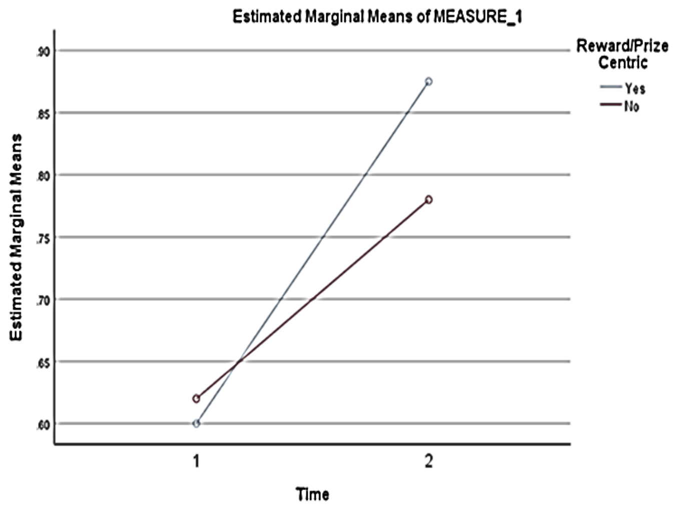

Figure 30. Reward Centrism (Yes and No groups) vs Confusion over time.

To summarise, significant correlations were detected between Mood and Position (staff/students), Gender (male/female) and Reward (reward-centric/non-reward-centric). These correlations were in conflict with the study's hypothesis as a reward system did not motivate candidates and did not enhance their mood. According to Table 25, Mood deteriorated with Gender, Position and Reward variables.

7.2.19. Tabulated results

Table 25. Relationship between Mood, Position (Staff/Student), Gender and Reward

Correlation between:			
Mood and Position	Staff	Student	Note
	Had no significant effect on mood	Students' mood was affected significantly	• Mood deteriorated • Contradicted with study's hypothesis
Mood and Gender	Male	Female	
	Had no significant effect on mood	Female's mood was affected significantly	• Mood deteriorated • Contradicted with study's hypothesis
Mood and Reward	No Group – Non-reward Centric	Yes Group – Reward Centric	
	Had no significant effect on mood	The 'Yes' group's mood was affected significantly	• Mood deteriorated • Contradicted with study's hypothesis

Analysis of Mood components showed that Position (staff/student), Gender (male or female) and Reward were correlated to Anger (Table 26).

Table 26. Relationship between Anger, Position (Staff/Student), Gender and Reward

TMD = Anger + Confusion+ Depression + Fatigue + Tension + (24 – Vigour)			
Correlation between:			
Anger and Position	Staff	Student	Note
	Had no significant effect on Anger	Had no significant effect on Anger	• Both groups' Anger increased but not significantly
Anger and Gender	Male	Female	
	Had no significant effect on Anger	Female's Anger increased significantly	• Deteriorated
Anger and Reward	No Group – Non-reward Centric	Yes Group – Reward Centric	
	Had no significant effect on Anger	The 'Yes' group's Anger was affected significantly	• Deteriorated

Analysis of Mood components showed that Position (staff/student), Gender (male or female) and Reward were correlated to Confusion (Table 27).

Table 27. Relationship between Confusion, Position (Staff/Student), Gender and Reward

TMD = Anger + Confusion+ Depression + Fatigue + Tension + (24 – Vigour)			
Correlation between:			
Confusion and Position	Staff	Student	Note
	Had no significant effect on Confusion	Students' Confusion was affected significantly	• Increased significantly for the students
Confusion and Gender	Male	Female	
	There was significant correlation between male and Confusion	There was significant correlation between female and Confusion	• Gender Confusion increased significantly
Confusion and Reward	No Group – Non-reward Centric	Yes Group – Reward Centric	
	Had no significant effect on Confusion	The 'Yes' group's Confusion was affected but not significantly	• Increased for the 'Yes' group but not significantly

The study did not find a significant relationship between Depression and Gender, Position or Reward centrism (Table 28).

Table 28 Relationship between Depression, Position (Staff/Student), Gender and Reward

TMD = Anger + Confusion+ Depression + Fatigue + Tension + (24 – Vigour)			
Correlation between:			
Depression and Position	Staff	Student	Note
	Had no significant effect on Depression	Students' Depression was affected but was not significant	• Deteriorated not statistically significant
Depression and Gender	Male	Female	
	Had no significant effect on Depression	Female's Depression was affected but not significantly	• Deteriorated but not statistically significant
Depression and Reward	No Group – Non-reward Centric	Yes Group – Reward Centric	
	Had no significant effect on Depression	Had no significant effect on Depression	• The 'Yes' group had some deteriorated depression but it was not statistically significant

Fatigue had no significant effect on Gender, Position or Reward centrism (Table 29).

Table 29. Relationship between Fatigue, Position (Staff/Student), Gender and Reward

TMD = Anger + Confusion+ Depression + Fatigue + Tension + (24 – Vigour)			
Correlation between:			
Fatigue and Position	Staff	Student	Note
	Had no significant effect on Fatigue	Students' Fatigue was affected but was not significant	• Student fatigue increased but was not statistically significant
Fatigue and Gender	Male	Female	
	Had no significant effect on Fatigue	Female's Fatigue was higher than male but not significant	• increased but not statistically significant
Fatigue and Reward	No Group – Non-reward Centric	Yes Group – Reward Centric	
	Had no significant effect on Fatigue	Had no significant effect on Fatigue	• not significant

Tension was not significantly related to Gender, Potion or Reward centrism (Table 30).

Table 30. Relationship between Tension, Position (Staff/Student), Gender and Reward

TMD = Anger + Confusion+ Depression + Fatigue + Tension + (24 – Vigour)			
Correlation between:			
Tension and Position	Staff	Student	Note
	Had no significant effect on Tension	Students' Tension was higher than staff	• Student's tension was higher but was not statistically significant
Tension and Gender	Male	Female	
	Had no significant effect on Tension	Female's Tension was affected but not significantly	• Increased but not significantly
Tension and Reward	No Group – Non-reward Centric	Yes Group – Reward Centric	
	Had no significant effect on Tension	The 'Yes' group's Tension was affected but not significantly	• Increased for the 'Yes' Group but statistically was not significant

Finally, the motivational traits of each group were examined, using the MTQs that participants completed before watching safety video. The results are presented below.

Information Recall. The study compared participants' information recall of the safety messages for each group (the control group, n = 27, *mean* = 39.93, SD = 13.00 and the reward group n = 26, mean = 37.69, SD = 20.64). The results revealed that numerically, the reward group had less recall of the safety messages. In order to determine if these differences are statistically significant, a sample t-test was performed and the results showed statistically, a significant difference between the two groups. The Levene's test (Table 31) also shows t (51) = -473, p = .017 which indicates mean recall information is significantly different between the two groups.

Table 31. Independent Samples Test – Recall comparison between reward and control groups

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig.(2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Items Remembered as (%)	Equal variances assumed Equal variances not assumed	6.057	.017	-.473	1	.638	2.234	4.720	11.709	7.242
	Equal variances assumed Equal variances not assumed			-.469	41.88	.641	-2.234	4.759	-11.839	7.372

These results could be due to induced anxiety and nervousness among students, who participated in this experiment during their exam period. And hence, despite their voluntarily participation, they might have felt obliged to take part in the experiment. Likewise, the results could have been affected due to students' anxiety about winning a prize.

7.3. Discussion

Experiment 1 revealed that mood and performance have a direct relationship under stressful conditions, similar to routine situations. In an aviation setting, a typical stressful situation is rapid disembarkation due to fire or smoke in the cabin. Experiment 1 suggests that induction of positive mood to enhance passengers' performance will increase their chances of surviving accidents.

In Experiment 2, it was noted that the use of humour and movie themes in the pre-flight safety briefing were not beneficial. This was due to the distraction they produced, which obscured the essence of the safety messages airlines try to give their passengers.

Experiment 3 was designed as an extension to Experiment 1 and 2 with an intention to improve passengers' safety. The experiment trialled an alternative method of attracting passengers' attention to the pre-flight safety briefing. It was hypothesised that a statement prior to the pre-flight safety demonstration, offering rewards for recalling safety messages, would improve passengers' mood and motivate them to pay more attention to the safety briefings.

Although the results of Experiment 3 partly contradict the study's hypothesis (i.e., a reward system did not induce positive mood amongst participants and did not produce enhanced information recall), it indicated that under certain conditions as portrayed in the Experiment's design section, it could create some negative outcomes. Nevertheless, the results could have been influenced by induced anxiety and nervousness, as the study was undertaken with the university students during the final exam period and, despite students' voluntary participation, they could have felt obliged to take part in the experiment. Likewise, the results could have been affected due to students' anxiousness to winning a prize. According to Deci et al. (1999), rewards can have conflicting effects. Deci et al. note that some psychological factors underly motivational needs, and each person can interpret the reward differently. Deci et al. believe that the effect of a reward depends on individuals' self-determination and perceived competence. Another factor which might have influenced the results of this experiment relates to the students' deteriorated mood, which could have been as the result of difficulties produced by the types of questions asked, by the questionnaire. Feelings of anxiety, frustration and sadness are commonly experienced when individuals encounter a stressful situation (Dykman, 1998). The control group results were in line with the researcher's expectation of no mood change within the group.

The unexpected results from the reward group led to the participants being subdivided into various groups for analysis of their reactions to the reward and mood change. Therefore, mood and information recall were assessed by gender (male/female), position (staff/student) and reward centrism (yes/no group –identified by the MTQ as reward centric or non-reward centric). Staff members did not show any significant mood change, while students' mood declined. Female's mood was initially higher than male's (happier) on average, but deteriorated much more over time. Finally, the reward-centric group's mood deteriorated significantly compared with the non-reward centric group.

7.4. Conclusion

Experiment 3 revealed some results which could not be analysed further due to the study's limitation such as participants' demographics (age, sex, and language proficiency) position or the correlation between their motivations to win a prize or the time period in which the experiment was undertaken (recall that students were within their final exam period). Future researchers should concentrate on each of the above factors such as the effect of rewards on more mixed samples (not only within university students) and use a much larger population.

Chapter 8: Discussion and Conclusion

The aim of Experiment 1was to investigate the effect of mood on performance in a non-normal situation. RQ1 was: Does mood affect individuals' performance under non-normal situations such as an emergency evacuation from an aircraft? It was hypothesised that participants in the positive mood manipulation condition would commit fewer errors and complete the evacuation quicker than participants in the negative mood manipulation condition.

The results of Experiment 1 revealed that mood could be manipulated in a desired direction simply by showing subjects three positive or negative images. This result was consistent with Richards and Whittaker (1990), who used three pleasant (scenic) and three unpleasant (violent) pictures to manipulate mood. These results confirm that positive mood manipulation improves performance during non-normal, stressful conditions (such as emergency evacuation from an aircraft), and conversely that negative mood manipulation causes performance to deteriorate during the same situation. Positive mood enhances performance in terms of number of errors committed and the time taken to disembark from an aircraft during a non-normal situation. Hence, mood may be used as a tool to improve performance and safety. This was in line with the study's expectation that the effect of mood on performance is similar irrespective of the environment in which the performance is tested as the participants with enhanced mood committed significantly fewer errors and completed the simulated emergency exercise in less time than the others.

The result of Experiment 1 is encouraging for the airline industry, as it indicates that passenger's evacuation performance can be improved using simple manipulation of mood.

The safety briefing that occurs on every commercial flight provides an opportunity to enhance travellers' mood. Some airlines have tried to increase passengers' attention to their briefings and make them more interesting using humour or well-known cultural material. This study investigated whether such safety briefings could improve mood.

The aim of Experiment 2 was to study if there was a relationship between mood and the content of pre-flight safety briefing. It was addressed by RQ1: Can the content of pre-flight safety briefings positively affect individuals' mood, and if so, is there a relationship between mood and retention of information contained in the briefing? The second aim was addressed by RQ2: Does employing humour or celebrities in a pre-flight safety briefing affect the retention of the key safety messages conveyed in the briefing? Hence, Experiment 2 was designed primarily to examine if mood could be manipulated through employing humour and using celebrities in pre-flight safety briefings and if humour or celebrities affect the retention of the key safety messages. More specifically, it was hypothesised that employing humour or celebrities in a pre-flight safety briefings can positively affect individuals' mood as well as their ability to recall key safety messages presented in the briefing.

Experiment 2 was designed as an extension to Experiment 1, to examine if the method in which the pre-flight safety briefing is delivered improves passengers' mood and ultimately their memory of the safety information. As noted earlier, some airlines use humour and employ movie themes and celebrities in attempts to attract passengers' attention to safety messages, and both were tested in this experiment.

The findings from Experiment 2 suggest that the pre-flight safety briefing is a unique opportunity for the airlines to engage with passengers and positively influence their mood states in order to improve their performance and increase their survivability in emergency evacuation events such as cabin fire and smoke conditions. However, it must be noted that the style of mood manipulation during pre-flight safety briefing has to be further studied in order to distinguish the extent in which information retention is related to the passengers' mood compared with the style in which the safety briefing is presented.

The final part of this study was to assess an alternative method of increasing passengers' attention to the pre-flight safety briefing. The aim of Experiment 3 was to investigate if a reward system could be used as a substitute method to mood manipulation in order to capture passengers' attention to the pre-flight safety briefing prior to a commercial flight. Recall RQ3 was: Could a reward system enhances passengers' mood and motivates them to pay more attention to the pre-flight safety briefing and in addition, if a reward system could influence passengers' memory to retain the safety information? More specifically, it was hypothesised that a statement prior to the pre-flight safety demonstration, offering rewards for recalling safety messages, would improve passengers' mood and motivate them to pay more attention to the safety briefings.

Experiment 3 was designed to examine whether a reward system could be used to enhance passengers' mood and improve recall of safety information contained in the pre-flight safety briefing. It was prompted by the results of Experiment 2, which revealed that using humour and movie themes in pre-flight safety briefings reduced passengers' recall of safety information in comparison to a standard briefing. In line with research in other industries which illustrates that performance and rewards are interrelated, it was expected that such a scheme would both encourage people to learn safety information and improve recall over time.

The findings from Experiment 3 were partly in contrast with other industries and did not achieve the predicted results. Rewards did not improve mood and did not enhance memory.

The findings revealed that rewards, under certain conditions, can have a negative effect (reducing performance). The results showed that some factors such as induced anxiety or nervousness for winning a prize, could negatively influence mood and memory.

8.1 Mood and performance congruence

Many studies have supported the existence of mood–performance congruence. Those studies revealed that performance is influenced by feelings (Hirt et al., 1996), and in the context of workplace, employees' moods and emotions and their overall dispositions affect their job performance, decision-making, creativity, sale/turnover, teamwork, negotiations and leadership (Knowledge@Wharton, 2007). The notion of a direct relationship between emotional states and work is supported by other scholars, such as Kelly and Barsade (2001), who argue that work settings are directly influenced by moods and emotions that people often experience at work. George and Brief (1992) suggest that moods and emotional states can have multiple effects on individuals and organisational behaviour.

The concept of a relationship between mood and performance was further scrutinised by Gendolla, Brinkmann, and Richter (2007) who state that emotions have motivational function to guide and control behaviour. For example, specific emotions such as fear, anger or aggression can influence goal priorities and induce actions by influencing behaviour. Moreover, emotions facilitate a fast and effective adaptation of the body's organism (Scherer, 2001) and become visible in their effect (adjusting) on autonomic nervous system activity, which controls behaviour (Gendolla et al., 2007). Gendolla et al. further clarify that the autonomic nervous system is a component of specific emotional property which prepares and mobilises the fast and short-lived body resources for organs to react. Gendolla et al. (2007) state that the motivational implications of moods are less clear than those of emotions. This is because moods are relatively long-lasting affective states with no clear awareness of their origins, contrary to the stimuli that provoke the short-lived emotions of happiness or sadness (Wilson, Laser, & Stone, 1982). Gendolla et al.'s (2007) findings suggest that mood has a direct implication for work and is a motivator for performance.

8.1.1. Effort and achievement

In line with the correlation between emotional states and performance, the relationship between effort and achievement is known to be multifaceted and depends on several variables such as individual's skills, experience, ability and the complexity of the task. It is now accepted that people have to concentrate and cope with the demands that are related to memory, attention and function at their outmost performance to progress and be rewarded accordingly. The reward in work settings could be conditional upon individual's performance (Trautwein, Lüdtke, Roberts, Schnyder, & Niggli, 2009).

8.1.2. Mood and motivation

Mood states are not only the key factors for work climate; they influence work motivation, performance and achievement (George & Brief, 1992). The relationship between mood and motivation and their implications at work has been studied in clinical psychology. According to the American Psychiatric Association (cited in Gendolla et al., 2007), persistent negative mood is one of the core symptoms of major depressive order and depression – a component of mood state which is associated with emotional, cognitive and motivational deficits (Heckhausen & Heckhausen, 2008). Gendolla et al. (2007) argue that mood can systematically influence motivational intensity and consequently, the extent of subjective demand becomes higher in a negative mood than in a positive mood when people are confronted with a challenging event. A challenging event in aviation resembles as a rapid disembarkation from an air craft during an emergency. Heckhausen and Heckhausen (2008) state that a person's motivation to pursue a certain goal depends on personal preferences, situational stimuli and the interaction of the two. Therefore, the resultant of motivational tendency is the combination of various factors associated with the activity, its outcome, and its internal (self-evaluation) and external consequences. They view motivation as either implicit (dispositional) or explicit (reflecting conscious, self-imaged values with characteristics people normally attribute to themselves). Heckhausen and Heckhausen explain that goal engagement is the perceptions, thoughts, emotions, skills and activities that are coordinated to facilitate either the attainment of goals or disengagement from goals which are not attainable (i.e., defending self-esteem against failure). Goal engagement can be perceived as having two motivational modes: go and stop.

8.1.3. Motives taxonomy

How can one person's disposition be distinguished from another's? Likewise, how can individual differences in terms of traits and their future behaviour be identified? Similarly, how many dispositions are there in total? The first logical step in answering these questions, according to Heckhausen and Heckhausen (2008), is to refer to the taxonomy of motives. Considering that individual differences are not limited to specific behaviours such as helpfulness or pugnacity, and are therefore not accurately measurable, it is reasonable to consider that there must be numerous dispositions and moods that categorise them. Therefore, the next level of classification should include both personal factors as well as situational factors in the form of motivational dispositions that contribute to the arousal of motives (Heckhausen and Heckhausen, 2008). Hence, a taxonomy of motives must take account of different situations with multi-personalities or in other words, various categories of people–environment relationship as the basis of motivational characters for any activity.

8.1.4. Motives and prioritisations

According to Maslow's hierarchical model (Figure 31) of the ontological development of individuals, security needs are prominent for young children, followed by the needs of belonginess and self-esteem. In adulthood the sense of self-actualisation becomes a dominant behaviour. Heckhausen and Heckhausen (2008) define self-actualisation as a ‘pull’ behaviour, a force developed qualitatively, which is different from the ‘push’ and is based on needs.

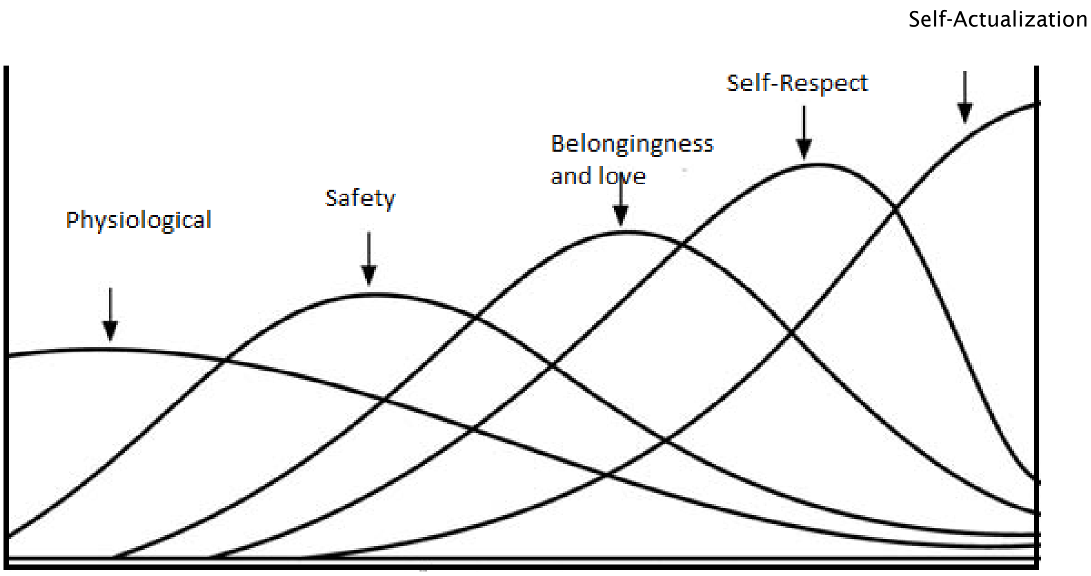

Figure 31. Maslow's hierarchical model orders groups of motives according to the relative priority of need satisfaction

People tend to focus on their own personal form of self-actualisation very seriously and prioritise it over other people’s needs. This type of behaviour has severe consequence in any hazardous and complex socio-technical setting, such as during emergency evacuation from an aircraft due to a fire and smoke event. These circumstances have been evident in several occasions. According to the NTSB, in 1996, in Quincy, Illinois, a United Express King Air and a commuter Beechcraft collided on the runway after landing. Although all 12 passengers and the two pilots of the United Express survived injuries from the impact, they all died during evacuation due to smoke and fume inhalation. Human performance was one of the contributing factors mentioned in that accident investigation.

Some events that have led to immediate response and required emergency evacuations are listed in Table 32. The list indicates engine fire and smoke as the most frequent causes of emergency evacuation.

Table 32: Events that led to emergency evacuations in 46 study cases (NTSB, 2000).

Event	Number of cases
Engine fire/suspected engine fire	18[a]
Cargo smoke/cargo fire indication	8
Smoke in cabin	4
Gear failure	4
Smoke in cockpit	3
Overran runway	3
Bomb threat	2
Landed short of runway	1
Lavatory smoke warning	1
Baggage cart collision	1
APU torch[b]	1

[a] An engine fire was present in 15 of these cases.
[b] As described in Boeing's *Airliner* magazine (April/June 1992), "The APU provides both electrical power and bleed air for the air conditioning system and main engine starting. A torching start may result from excess fuel accumulation in the APU combustor assembly and exhaust duct. The torching start has a characteristic 'orange flash'."

Not every non-normal situation requires rapid disembarkation hence, individuals' motives and priorities would be substituted with the instructions provided by the airline. For example, when an aircraft encounters a mechanical failure while still on the ground, e.g., nose wheel steering, flight control malfunction or faulty instruments) the flight has to be terminated and passengers have to evacuate the aircraft in an orderly way. Some of these problems can even be fixed while passengers are onboard.

8.1.5. Passenger injury

NTSB conducted a study of passenger survivability in 46 aircraft accidents in which 2651 passengers and 195 crew members were evacuated. Two hundred and eight passengers and 13 crew members were injured, and 10 passengers and one crewmember were killed (Table 33).

Table 33: Number of crew and passengers injured in the 46 study cases, by severity of injuries (NTSB, 2000).

Person on board	Uninjured	Minor	Serious	Fatal	Total
Crew	181	9	4	1	195
Passenger	2,433	161	47	10	2,651
Total	**2,614**	**170**	**51**	**11**	**2,846**

[a] Includes accident- and evacuation-related injuries.

Other studies from organisations such as the Canadian TSB, the JCAB, the FAA and the United Kingdom's Civil Aviation Authority (CAA) all point to certain factors as the main issues for fatal and serious injuries during emergency evacuations. For example, the TSB's findings from a post-accident examination of 21 emergency evacuation events highlighted the inadequacy of public address systems, the requirement for implementation of joint human factors training for the flight crew and cabin crew, and the provision of detailed briefings to prepare passengers for unplanned emergencies (TSB, 2013).

Similarly, the JCAB, in examining five emergency evacuations, found that a standard package of information was needed for improving passengers' briefing system (Tomita, 1999). Furthermore, the JCAB recommended a systematic approach to the definition of exit seating and the role and responsibilities of the cabin crew and passengers sitting in the exit rows. FAA's Civil Aeromedical Institute also conducted a study of emergency egress system for a period of two years and found 193 reports of injuries from 109 emergency evacuations in which passengers were competing to evacuate.

The CAA commissioned Cranfield University to conduct research into cabin safety. The first study related to passengers' behaviour and the influence of cabin configuration on the rate at which the aircraft can be evacuated. While two studies concentrated on cabin configuration, the distance between exit row seats and passengers' ability to operate overwing exits, the third study examined the influence of the cabin crew on passenger evacuation both during competitive and cooperative procedures. The study found that both the performance and the number of cabin crew significantly influenced passengers' behaviour and the rate at which the cabin could be evacuated. Similarly, other organisations such as Transport Canada Civil Aviation and Ente Nazionale Aviaziona Civile of Italy have found that human factors were the main causes of injuries during emergency evacuation (NTSB, 2000).

Despite several issues leading to fatal and serious injuries during emergency evacuations from aircraft, human behaviour, encompassing performance and compliance with the safety information provided by the airline prior to the flight, is a major contributing factor, but little is known about the nature of this relationship during non-normal situations. The impetus for this research was to learn whether mood could improve passenger' performance during situations when rapid disembarkation from an aircraft becomes vital for survival.

8.1.6. Passengers' inattention to safety briefings

It is commonly known that the passengers' inattention to the pre-flight safety briefing can put enormous workload on the cabin crew during emergencies. Civil aviation authorities assume that the airlines know the best ways to capture passengers' attention (FSF, 2000), while some cabin safety specialists believe that creative methods need to be used to improve passengers' attention to safety messages prior to the flight(FSF, 2000).

The NTSB surveyed 457 passengers and found that 54% of passengers did not watch the entire cabin safety briefing prior to the flight and 15% did not watch it at all (FSF, 2000). This has serious consequences: a common finding from several studies of passengers' pre-flight education is that cabin crews encounter enormous pressure and overwhelming workload during an emergency if a large number of passengers are not familiar with the safety equipment (such as how to use the oxygen masks, to wear the lifejackets properly, the use of nearest exits or they do not follow the safety instructions given at the pre-flight safety briefings) (FSF, 2000).

Passengers’ inattention to the pre-flight safety briefing and their complacency about safety messages can hinder or delay aircraft’s emergency evacuation. This was evident in a Manchester Airport accident in 1985, when a fire broke out during an aborted take-off. According to Mullen (2015), one of the overwing exits was blocked hence, produced delays in use of that exit. Similar delays and hindrances at the other exits resulted in 57 fatalities among the 137 passengers.

Regulators have highlighted the issue of passengers’ lack of attention to pre-flight safety information and recommended airlines capture passengers’ attention through innovation and thinking ‘outside the box’ (FSF, 2000). The NTSB also acknowledges changes in demographics, culture and communication which open ways for creative approaches to pre-flight safety briefings in order to attract passengers’ attention. However, these ideas are not supported by the findings of Experiment 2, which revealed that certain creative approaches (i.e., utilisation of humour and movie themes) used in pre-flight safety briefings were disadvantageous and reduced information retention.

As accident investigations have pointed out, the pre-take-off briefing is often the only safety information passengers will receive, and education about safety apparatus and procedures is vital for survival in the event of an accident (FSF, 2000). This is because, as noted earlier, cabin crew already face a massive workload during an emergency, and will have little time to assist passengers who are unaware of basic emergency procedures or equipment such as, operation of emergency exit doors, use of oxygen masks or utilisation of floatation devices. This problem is a persist one, as demonstrated by the passengers of a Southwest

Airlines flight in 2018, which demonstrated their lack of information and ineffectiveness in terms of complying with oxygen mask operation (see Figure 4, Chapter 2).

The emphasis on specific words during pre-flight safety briefing on how to use the oxygen mask by covering both mouth and nose, extending the mask's connecting tube to initiate the flow of oxygen, whom should receive the oxygen first (i.e., Adults or children) and the logics behind the brace position are all briefing elements which originate from problems with passengers in the past (NTSB, 1985). Federal aviation regulations require airlines to provide safety briefings and safety cards to inform passengers of the procedures and the safety apparatus on board aircraft prior to departure. The exact content of the safety briefing and the way the information is presented are the airline's responsibility, as long as the minimum safety information is delivered. However, according to Corbett, McLean, and Cosper (2008), even passengers who claim they pay attention to safety briefings have little knowledge and understanding of how the information provided could improve their safety and increase their chances of survival.

Passengers with different levels of intelligence, attention, compliance and complacency may not be able to absorb all of the safety information presented and could misunderstand life-threatening events as not critical. For example, in some incidents reviewed by NTSB, passengers apparently did not perceive life-threatening situations because they did not visually see the hazards and foresee their consequences (e.g. fire or structural damage to the aircraft). In those circumstances, passengers may form a different perception than the cabin crew, think that the evacuation is a routine rather than emergency procedure (FSF, 2004). NTSB accident investigators interviewed two passengers seated next to each other in first class, and learned that they had completely different understandings of the same non-normal situation. While one complained that the flight attendants did not provide any instructions or guidance, the other appreciated the flight attendants' professionalism and stated that the instructions were very clear and concise. The second passenger even recalled the precise shouting orders the cabin crew gave, such as "leave everything, take off your shoes and come this way" (p. 2).

Passenger injury for insufficient knowledge about safety instructions during emergency evacuation has been highlighted in several aircraft accident reports. According to FSF (2004), in 1997, during an emergency evacuation from a Lockheed aircraft, passengers going down the slide started to collide and pile up. The flight attendants reported later that although they instructed passengers to leave their belongings behind, some passengers attempted to take their bags with them. Bags and purses were found scattered on the floor near the exit door and at the bottom of the slides. The report also refers to hazards and clutter near the exit doors created by passengers who disobeyed instructions, trying to recover their belongings in the last minute. Furthermore, passengers attempting to carry their belongings could lose their situational awareness and cause injury just by not focusing on the instructions provided by the crewmembers. A review of the accidents revealed that large picture frames, crutches and guitars were among items passengers took off the aircraft. Also, an NTSB investigation of an overwing evacuation included a video recording showing a passenger holding two suitcases and others trying to get off the wing with their carry-on baggage(FSF, 2004). Furthermore, the NTSB noted that some passengers threw their carry-on bags down the slide before jumping, creating a new hazard and risking injury to other passengers.

Blocking of the unused emergency exits with carry-on bags or other items during emergency evacuations can become detrimental as in one case, the cabin crew initially did not believe that slide deployment were required at every available door. According to Robert Molloy, a NTSB's transportation research analyst, the situation became worse and the unused emergency exits were blocked by the piles of carry-ons and bags in front (FSF, 2004). Molloy states that in similar situations the delays behind the exit door had caused people to be fatally injured while waiting in the queue.

The NTSB admits that it is almost impossible to judge the cabin crews' prompt decisions for taking away passengers' belongings during an emergency evacuation (FSF, 2004). Therefore, NTSB suggests that cabin crew should be trained and become familiar with the psychology of passengers who refuse to surrender their carry-on baggage. Cabin crew should learn about the degree of assertiveness they need, as the argument with passengers at critical moments can develop into a conflict, leading to further delays with exacerbated conditions. NTSB recommends that although training should address the importance of removing carry-on items from passengers during emergency evacuations, the crew should avoid reaching to a point where safety of one individual could overweigh the safety of the others. Cabin crew should also remember that if they are pushed down slides accidentally or during conflict with a passenger, they would not be able to resume their duty, which further compromises safety. In addition, crew members who sacrifice self-protection while handling non-compliant passengers may lose their own situational awareness and drift away from their standard operating procedures.

In 2002, the FAA released a guideline on cabin crew training, specifically how to handle carry-on baggage during an emergency evacuation (FSF, 2004). The guideline contained the following items:

- Flight attendants should be forceful and commanding as they instruct passengers to leave everything on the aircraft;
- The carrier should develop procedures to handle carry-on baggage during an evacuation, teach the procedures to flight attendants as part of their approved training program, and practice the procedures during evacuation drills;

- [Procedures] could include throwing [a piece of carry-on baggage] out the aircraft forward or aft of the evacuation slide, throwing it back into the cabin into empty seats, etc.; [and,]
- Another consideration is the fact that a battle with a passenger over a piece of carry-on baggage may be more detrimental to the rapid egress of the aircraft than allowing the passenger to take it. (p. 1)

The FAA’s guideline however, was not backed with much authority and viewed by some NTSB rescue specialists as unhelpful because it contained few tangible measures of compliance and problems resolution. Consistent with the safety issues and the disobedience of the passengers during critical times when passengers’ lives are threatened, Nora Marshall, the Chief of NTSB’s Survival Factors Division, articulated about an aircraft that had to conduct an emergency evacuation after an in-flight fire and half of its occupants were fatally injured. She remembered reading a statement of a passenger who tried to become the last one evacuating that aircraft as he could take time to get his carry-on baggage. The passenger had stated that it took him a few more minutes to find a train case he carried and had stowed it under the seat. Nevertheless, this passenger was exposed to the fire, smoke and fume which required rapid evacuation from the aircraft (FSF, 2004).

Although in the previous case the guideline did not illustrate much influence on passengers’ compliance, in another accident, a McDonnel Douglas DC-10, which involved in an intense cabin fire, all the passengers who were crew members (non-operating crew members transferred to other ports for duty) survived without fatality because they were trained, moved quickly and adhered to the ‘leave everything behind’ policy.

The DC-10 accident and the survivors do not warrant an improvement in general safety, it portrays an image of success if ordinary passengers become competent to follow the rules and survive. So, how should the aviation industry ensure that passengers pay attention to the pre-flight safety briefing and follow the rules required for survival? Corbett, McLean, and Cosper (2008) state that it is imperative to revisit the pre-flight safety briefing to make it more meaningful so that it improves passengers' accident survivability. Based on the findings of Experiment 1, the pre-flight safety briefing provides an opportunity not only to educate passengers about aircraft safety features, safety services and passengers' responsibilities, but to positively manipulate their mood so as to enhance their performance in an emergency.

8.1.7. Music and mood

Music has a powerful effect on mood and perception (Jolij & Meurs, 2011). According to Jolij and Meurs, music and mood are closely interrelated; listening to sad or happy songs can affect mood and can change the way one perceives the world.

Lesiuk (2005) examined the effect of music on emotional state, work quality and time spent on the task by studying 56 software designers and their work environments at four software companies over five weeks. The results revealed that the emotional states and quality of work were lowest with no music, and the time spent on tasks was longer when music was absent. The study also revealed evidence of a positive learning curve when music was played.

According to Lesiuk (2005), music may be used as an anxiety preventive or anxiety reducing measure. In line with Lesiuk (2005), Knight and Richard (2001) through an experiment (i.e., by requiring an oral presentation as a cognitive stressor), fond significant increases in stress level were experienced for those who undertook the task without music. Conversely, the presence of music suppressed the increases in anxiety, blood pressure and heart rate.

Driving a car is another task with which scholars have sought to determine the effect of music on mood and performance. Van der Zwaag et al. (2012) in line with Lesiuk (2005), found that people often try to enhance their mood with music as they believe that their mood can influence their behaviour and eventually improve their performance. Van der Zwaag et al. (2012) examined the effect of happy, sad or no music while driving on the physiological condition and performance of drivers tested in a simulator. Each participant had to complete three sessions with one type of music each day. The results revealed that music induced mood, positive music led to improved mood with more relaxed body state, and that driving with no music generated negative feelings similar to those of driving with negative music.

Although in Van der Zwaag et al.'s (2012) study music did not impair driving performance, other researchers produced conflicting findings. For example, Tze and Chou (2010) studied whether background music affected students' reading comprehension and how different types of music affected students' performance. Their experiment involved 133 Taiwanese college students conducting a reading comprehension task with either light classical, hip hop or no music (the control group) in the background. The results of the study revealed that the high-intensity music had greater (negative) effect on performance than low-intensity music. Moreover, students with no background music achieved higher scores on reading comprehension than others. Although the study had been strictly followed the research methodology, it did not address ethnical and cultural diversities for musical preference and if Taiwanese college students liked listening to the Mozart's classical music played in the background.

Huang and Shih (2011) sought to determine how different types of background music affected workers' concentration and attention. The results concluded that the background music influenced listeners' attention. The influence however, depended on the listener's fondness (liking or disliking) of a particular piece of music rather than the type of music. Huang and

Shih concluded that it is important to play types of music that listeners would not strongly like or dislike in order to avoid negatively influencing their performance.

Furnham and Allass (1999) found a correlation between the complexity of background music and performance through research with 48 extroverted (people who tend to be outgoing and are more talkative) and introverted (people who are more listeners and shy) participants undertaking cognitive duties. The task required a reading comprehension test, an observation test and a memory test (in which participants' memory were measured). Furnham and Allass concluded that simple music, unlike complex music, offers the most suitable balance of simulation for both introvert and extrovert individuals.

The complexity of music is related to the information load it carries and how it can stimulate listeners. For example, jazz music, although it contains a variety of styles, tempos and a large tonal and rhythmical range, carries a small information load, does not contain over-arousal features and includes simple and repetitive rhythm (Furnham & Allass, 1999). Furnham & Allass' experiment revealed that distraction due to complex music impaired the performance of the introverted participants. Moreover, introverts reported significantly more disturbance from complex than simple music, suggesting that the interrelationship between musical background and performance is dependent on both the type of the music (i.e., complex verses simple) and listeners (i.e., introverts verses extroverts).

Although several studies have supported the correlation between mood and music, it can be argued that music as an enhancing mood strategy is not perceived commonly having positive mood control. Music is linked to culture (Ramadani, 2017), personal preferences (i.e., like and dislike), age and gender (Whiteley, 2003), and considering the blend of air travellers as they are influenced by their culture (Dsilva, 2015), no specific music can be suitable for all. In fact, music which is not attributed to a specific culture could have an adverse effect (i.e., not a preferred music or linked to the past experience) with an overriding effect on behaviour (Lesiuk, 2005). Despite correlation between music, emotional states and performance, the diversities in music, music listeners', age differences, individuals' preferences and the gap between musical and non-musical stimuli can potentially create several issues and require further research which is beyond the scope of this study.

8.1.8. Light and mood

Samuels (1999), introduced light as an alternative mood controlling practice. Samuels refers to a report presented to the Department of Education and Training, narrating the interrelationship between light, mood and performance. The report indicates that anxiety, depression and Seasonal Affective Disorder (SAD) syndromes were reduced significantly by light stimulation. Samuels believes that asserting full spectrum lighting conditions have made substantial positive effects on attentiveness, state of mind, mood, behaviours and an overall improved results on performance.

The correlation between performance and lighting has been extensively studied. For example, Rot, Moskowitz, and Young (2008) found that bright light could be used to treat depression and has positive effects on mood in healthy individuals. Rot et al. by studying the correlation between light and behaviour noted that participants in bright light, independent of time of the day, seasons and location, exhibited less argumentative behaviour, improved mood state and were more cooperative than other participants. Light has direct effects on non-visual functions such as heart rate, alertness and hormonal substance secretion (Cajochen, 2007). The most convincing evidence of this comes from Cajochen (2007) and Lockley (2009), who compared blue light with green and red, finding that blue light has greater influence on circadian rhythms, pupil light reflexes and heart rate. Furthermore, Vandewalle, Maquet, and Dijk (2009), in support of the blue light effect, state that blue light has significant effect in neutral responses. This was evident within one minute to blue light exposure (stronger brain activation of brainstem or thalamus send messages to other organs to control breathing, heart rate or blood pressure) compared with green and red light.

8.1.9 Light and alertness

Lehrl et al. (2007) used a blue light to enhance alertness and information processing. Although the study did not measure participants' mood changes, it revealed a significant increase in alertness and speed of information processing compared with a normal light. Other scholars such as Brown et al. (2014) investigated the efficacy of blue light therapy for improving the behavioural alertness of flight crewmembers. Crewmembers were asked to wear actigraph bands and use the Karolinska Sleepiness Scale to monitor and record their sleep profiles and self-assess their fatigue using the Samn-Perelli Fatigue Scale over four weeks. Participants' behavioural alertness was measured by completing the Psychomotor Vigilance Test. After two weeks, participants were exposed to light therapy – blue light with short wavelength (465nm). The results revealed a significant improvement in the alertness of all crew members due to the intervention.

Modern aircraft such as the B787 (Dreamliner) and Airbus A380 have mood lights installed to help passengers to adjust to new time zones (Brown et al., 2014). People in other sectors of the aviation industry, such as air traffic controllers, may benefit from exposure to blue light as they must continuously deal with fast-paced situations, rotating shift work schedules and constant pressure, making them vulnerable to fatigue. Brown et al. noted that the benefit of light therapy has been extended beyond aviation industry and is used to treat depression, dermatological problems (skin and nail treatment), psychiatric, neurological, gerontological (dealing with age) and work related issues such as problems related to shift work.

According to Cajochen (2007), light exerts a powerful non-visual effect on biological functions and behaviour and has alert or wakefulness features. Cajochen examined if the alerting effect of light and its wavelength play an essential role in an anti-depressant response. He noticed that blue light had been tested earlier against red light for clinical efficacy in treating depression and SAD. Although blue light therapy was successful, Cajochen was not convinced that the treatment was effective, as there were some concerns for the tolerability and the possibility of adverse effects. Beyond SAD, Cajochen claims that light therapy appears a promising treatment for other major depressing disorders as well as antepartum, postpartum and seasonal adult attention-deficit disorder manifestation. Furthermore, he states that people working in an office environment under a vertical illuminance level of less than 1,000 lx reported experiencing significantly more fatigue and worse sleep quality than people working under high level of illuminance.

The efficacy of blue light for enhancing passengers' mood and improve their performance has never been tested under stressful conditions. The test under life-threatening situations (i.e., aircraft cabin fire and smoke with low visibility) may not have positive results as manifested under normal conditions. Mood-enhancing strategies employed by the airlines regardless of their commercial benefits (i.e., passengers become happy and fly with the same airline again), should be purely focused on aircraft safety, as prescribed in Chapters 2, 3 and 4.

8.1.10. Reward and performance

As noted previously, manipulation of mood can be used as a tool to improve performance and safety. While this relationship is not new, Muir and Thomas (2004) used financial incentives to improve (i.e., to reduce) the egress time in an emergency evacuation. Recent studies support a link between rewards and memory consolidation. Murayama and Kitagami (2014) believe that extrinsic rewards can enhance memory by dopaminergic modulation process. Dopaminergic effects increase dopamine activities in the brain through neurological transmissions, a process regarded as memory enhancement (Shohamy & Adcock, 2010). Shohamy and Adcock also believe that dopamine ensures that memories are relevant and accessible for future information retrieval and adaptive behaviour. Murayama and Kitagam further state that there is a rewards pathway (i.e., a mesolimbic system known as reward pathway) in the brain that can be activated by extrinsic rewards. This notion that extrinsic reward enhances memory performance is further supported by Bialleck et al. (2011). Although some studies have not found a direct link between extrinsic reward, motivation and attention, other studies suggest that strong incentives, properties of the reward system drive people to pay attention and to become engaged in learning tasks (Murayama & Kitagami, 2014).

8.1.11. Mood enhancement strategy

Whereas each researcher has adopted a particular method for mood manipulation, by comparison, it is imperative to determine which one of the those methods could be more effective within an aviation environment. In the current study participants' moods were manipulated through three different methodologies: positive and negative images in Experiment 1, the use of humour and celebrities in Experiment 2, and the use of rewards as a motivational instrument and a mood enhancement strategy in Experiment 3. Although the results from Experiment 1 and 2 demonstrated that participants' mood could be successfully manipulated to the benefit of performance in an evacuation, the results from Experiment 2 revealed that the use of humour and movie themes obscured the pre-flight safety information.

The paradox of the use of humour leading to both enhanced mood and weakened memory could have been due to the style of presentation. Specifically, humorous components of the videos were often paired with key safety messages, and in doing so could have prevented the message from being communicated effectively (and ultimately recalled). The effect of rewards in Experiment 3, in contrast to Experiment 1 and 2, suggested that a reward system was not effective and research subjects' mood deteriorated. This is further discussed in the limitations section.

8.2 Results overview

The results from Experiment 1 revealed that the pre-flight safety briefing is an opportunity for airlines to positively influence passengers' mood and enhance their performance. The benefit of positively influencing passengers' mood would become important in unexpected situations such as US Airways accident in 2009, which experienced an in-flight emergency shortly after take-off and were left with little time to prepare the cabin for emergency evacuation (NTSB, 2010).

A positivist methodology based on evidence was used objectively for Experiment 1, collecting data quantitively from two participating groups, one with mood manipulated negatively and the other positively. The experiment used POMS-SF which is a well-established tool for evaluating mood and undertaking statistical analysis. Then, participants' Total Mood Disturbance (TMD) scores were calculated by utilising Analysis of Variance (ANOVA). Errors committed by each participant and the time taken to evacuate a mock aircraft were measured to test the study's hypotheses.

The results of Experiment 1 revealed that participants with positive mood committed fewer errors and completed the evacuation in less than half of the time taken by participants who were in negative mood. The findings from Experiment 1 highlight the importance of creating an environment that induces positive mood.

In Experiment 2, passengers' recall was measured using a questionnaire containing items included in the pre-flight safety briefing. ANOVA was used for analysis of Experiment

2. The dependent variables in Experiment 2 were Mood, measured by TMD, and recall performance – the percentage of key safety messages recalled.

The results of Experiment 2 confirmed that the pre-flight safety briefing video can be used to manipulate passengers' mood. Some airlines attempt to capitalise on this by providing participants with an entertaining safety video that is either comical or uses familiar cultural concepts to enhance their mood. However, there appears to be an inverse relationship between entertainment and education. Specifically, the results of Experiment 2 suggest that higher entertainment value results in poorer retention of key safety messages.

The most obvious reason for the results recorded in Experiment 2 is that entertaining videos increase cognitive load and reduce processing of safety information. More specifically, there were greater stimuli in both humorous and movie featured videos, which could have added pressure on individuals' information processing and undermined the core effect of the safety messages. This is similar to the added cognitive load revealed in an experiment conducted by Lee, Lee, and Boyle (2007) when participants engaged in an auditory task with short glances away from roads, which increased the likelihood of drivers missing safety-critical events (Lee, Lee, & Boyle, 2007).

The results of Experiment 2 have major implications for some airlines, which have transformed their pre-flight safety briefings by incorporating entertainment in an attempt to attract and hold passengers' attention. Hence, the findings of Experiment 2 are likely to be disappointing to them, as their investment in blending the pre-flight safety briefing with humour and entertainment does not improve recall of crucial safety information. Likewise, the findings might be disappointing for the passengers who seek more entertainment and prefer humorous features or movie characters. Moreover, some passengers may prefer to learn at least some of the safety matters through entertainment than none (referring to the boring and repetitive videos). This is an area of research, perhaps in the future.

Experiment 3, the final part of this research, was designed as an extension to experiments 1 and 2. It tested whether rewards could improve recall of information from pre-flight safety briefings. Recall, it was hypothesised that a statement about rewards prior to the pre-flight safety demonstration would improve passengers' mood and motivate them to pay more attention to the safety briefing and improving their recall of safety information.

Non-parametric data collected during Experiment 3 were analysed with a one-way ANOVA. The findings acquired from two groups of volunteers, a control group which received no promise of a reward and a reward group, which were compared to identify if the reward system would effectively motivate passengers to recall pre-flight safety information.

The notion of a direct correlation between rewards and performance has been studied amongst organisations and entrepreneurs. It is believed that a reward system is the best way to improve individual performance (Hamukwaya & Yazdanifard, 2014).

Experiment 3 was conducted under guidelines assigned by the Human Research Ethics Committee (HREC) of USQ (see Appendix C), and the positive feedback and acknowledgment received from the Confirmation of Candidature panel. Although participants were confined to university students and the staff which might not have been fully representative of typical commercial travellers (i.e., various cultures, languages, literacy and age difference), Experiment 3 was designed to mix the participants to lessen the limitations (i.e., staff and students) with the aim of more realistic representation from the community. Two identical groups (control group and reward group) were selected randomly and underwent the same procedure by filling out consent form, demographic form, motivational questionnaire and two POMS-SF questionnaires. The only difference between the two groups was that at the onset of the experiment, the researcher informed the reward group that they could win $100 if they would answer all of the main safety messages correctly, under the subheadings: Baggage, Seat Belt, Oxygen, or Brace position. (see table 4). Participants had to fill in a second POMS – SF at the cessation of the experiment.

The results of Experiment 3 revealed that the control group who were subject to the conventional safety video and not provided with a reward, did not illustrate any mood changes or obtain high scores on the motivational trait questionnaire (refer to Appendix C) and only recalled an average of 40% of the safety information contained in the video. Hence, the results of experiment 3 for the control group were in line with the study's hypothesis: participants' performance was in line with the predicted outcome.

The reward group however, did not follow the predicted direction and displayed mood deterioration, decreasing motivation and more importantly, showed the same capability of remembering safety messages as the control group (i.e., 40 %). The results of Experiment 3 in relation to a reward system was negative, when compared with the research questions of 'Could a reward system enhance passengers' mood and motivate them to pay more attention to the pre-flight safety briefing and additionally, could a reward system influence passengers' memory to retain the safety information?' Therefore, further analyses were conducted to determine why the aviation industry did not respond in line with the research hypothesis and did not show a positive relationship between reward and performance similar to other industries.

In order to conduct further investigation, the reward group was divided into two subgroups, separating staff from students and it was revealed that the staff with higher age did not show a mood change while students with significant age difference (M = 47.22 vs. 19.06) displayed declined mood changes.

Various reasons could be considered for students' poorer performance, offering some probable causes to explain the paradox of these results. For example, the staff with more experience and maturity were not influenced by the experiment or the reward offered for the recall of information, while students' mood, despite their volunteered participation, was deleteriously affected and their recalling capability was reduced. These results could have been influenced by age differences between the two groups. Students' poor performance could have also been as the result of the experiment's timing as the experiment was conducted during students' exam period. Furthermore, students could have been encouraged to earn quick pocket money by participating in the experiment, but the tension and anxiety caused by the experiment could have caused confusion and affected their performance.

The reward group was also divided into two subgroups of male and female and their mood were compared with each other. It was noted that females' mood deteriorated much more than the males. These results suggest that females were experiencing greater anxiety, tension and confusion leading to their poorer performance. The detailed analyses are depicted in chapter 7.

8.3. Implications for practice

The results of this study have important practical implications. In Experiment 1, participants' mood was positively manipulated through exposure to pleasant images. In Experiment 2, mood was positively manipulated through humour. Other techniques have been used to manipulate mood, such as De Dreu et al.'s (2008) autobiographical memory task which required participants to write a short essay about themselves, in order to make them feel really good or bad (depending on the discrete mood condition: angry, sad, happy or relaxed) and extract the key words to produce that feeling. Likewise, De Dreu et al. in another part of their study, used a brainstorming technique (which involves asking participants to express unique ideas to complete a task). However, neither strategy is an ideal model in an aviation environment, as the non-normal situations have been all mandated to specific procedures and any deviation from those instructions can be detrimental and have devastating consequences.

Experiment 3 suggested that a reward system under certain conditions, may not be an effective means of attracting passengers' attention to the pre-flight safety briefing and maximising recall of information. The effect of rewards on capturing airline passengers' attention requires further investigation.

The foremost focus of aviation governing bodies such as the FAA (2015) in the United States, Transport Canada (TC, 2008) and CASA (2005) in Australia is to enhance safety by providing guidance and enforcing and regulating safety management systems. In response, airlines have developed systems to manage risks, notably pre-flight safety briefings to educate passengers about the safety features of their aircraft and about how to behave in the unlikely event of an emergency. However, many passengers ignore the pre-flight safety briefing, deeming it repetitive, familiar (i.e., old information), and/or boring (Fennell & Muir, 1992; Seneviratne & Molesworth, 2015). The results of the present study suggest that passengers' education about their aircraft's safety features and emergency procedures can be improved, or specifically their safety information retention can be enhanced, through mood manipulation.

It is anticipated that the findings of this research will not only impact the airline industry to reposition their approach when designing pre-flight safety briefings, it connotes as a potential application for other socio-technical industries where the rewarding systems may apply. Regulatory bodies such as the International Civil Aviation Organisation, FAA, CASA and European Aviation Safety Agency should take note of these results and recommend that airlines abandon recently adopted methods of pre-flight safety briefing delivery involving the extensive use of humour or movie themes and personalities. Instead, encourage operators to present motivational schemes that attract passengers' attention to safety briefing prior to each flight. The knowledge derived from this study may offer operators of other forms of high-capacity travel, such as cruise ships and trains, ways to attract passengers' attention to safety briefings and thereby improve the effectiveness of emergency evacuation procedures.

8.4. Limitations and future studies

One limitation of this study relates to the samples of participants employed. All participants were recruited from students at UNSW and students and staff of USQ. The Australian population – and more specifically, Australians who use commercial airlines, undoubtedly have greater diversity in age, health. culture and education. Future research would benefit from more diverse samples that are more representative of the population.

Future researchers should also investigate how contextual factors such as the environment of an aircraft, namely noise, seating, group travelling (i.e., family, student excursions, sport teams) and how visual acuity affects individuals' recall of the safety messages as well as mood, and examine their impact on retention of information from briefings.

Another limitation of the present study relates to the use of simulation. While there was no indication that participants did not take the research seriously (notably, during the simulated emergency evacuations), it needs to be acknowledged that participants' performance in the present study may not reflect their optimum performance as of a real-life accident. As mentioned earlier, this limitation is not unique to this study, but applicable to all researches that use simulators for various reasons (e.g. ethics, cost).

The results of this study should be extended by applying different stimuli to enhance mood and while comparing different techniques, examine the memory's capacity associated with each.

Study 2 revealed that mood was enhanced by the use of humour and movie themes. However, it was determined that safety information retention was influenced by the method in which mood was manipulated. This is an obvious direction for future research.

The results of Experiment 3 were only partially in line with the study's hypothesis. Therefore, the same hypothesis could be tested in further research without the limitations confronted in Experiment 3, including recruitment only from university students and staff, selection of larger samples and easier questions for candidates to answer or increasing the reward value.

Another possible area for future researchers is the association between organisational culture such as values, norms and attributions to safety and passengers' behaviour on commercial flights during emergencies.

8.5. Conclusion

The relationship between mood and performance in normal conditions has been studied widely. Researchers have demonstrated that positive mood or happiness improves memory and performance, and conversely, negative mood or sadness causes performance to deteriorate, reducing work efficiency and increasing errors. However, the relationship between mood and performance in non-normal conditions has been neglected. In commercial aviation, rapid disembarkation of passengers in an emergency is arguably the most important non-normal situation. Hence, the primary objective of this study (Experiment 1) was to examine the effect of mood on performance during an emergency evacuation of a passenger aircraft.

The literature shows that passengers often do not pay enough attention to the pre-flight safety briefing and undervalue the safety information provided by the airline prior to each flight. There are several studies that have identified the necessities for attracting commercial passengers' attention to the safety information as in critical circumstances, passengers have to be able to retrieve the safety information and precisely follow them. Some airlines have used innovative techniques such as employing movie themes or humour to deliver safety information in order to attract passengers' attention to the pre-flight safety briefing and improve their mood and information recall. Therefore, the second objective of this study (Experiment 2) was to assess the benefits of using humour and movie characters or themes in delivering pre-flight safety briefings.

Several studies have highlighted the benefits of rewards on performance and acknowledged that the reward system is an extension to motivational process that provides satisfactory performance. It is also believed that a financial reward system would normally capture people's attention. Consequently, a reward was considered to be an effective method for motivating airline passengers to pay more attention to the pre-flight safety briefing. Therefore, the final objective of this study (Experiment 3) was to assess the ability of a reward system to improve passenger's mood and recall of safety information.

In Experiment 1, a simulated aircraft emergency evacuation showed that, consistent with the study's hypothesis, the effect of mood on performance is similar irrespective of the context or environment in which the performance is examined. The study revealed that passengers with enhanced mood committed significantly fewer mistakes and took less time to complete a simulated emergency exercise than the group with negatively manipulated mood.

Experiment 2, was an investigation of the effects of using humour and movie themes or characters on mood and recall. It confirmed that the participants' moods were positively affected by using entertainment in the pre-flight safety briefing; however, it was found that these styles of mood improvement reduced recall of safety information. The added entertainment could be interpreted as excessive stimuli, which could defeat the intended purpose of improving attention to safety briefings and the recall of instructions.

The final study found that mood deteriorated and recall of information was not improved when rewards for performance were offered. There are several factors such as the sample ingenuity, as the participants were from university staff or student groups. The average staff member's age and experience were substantially different from the students. The reason for such a result could have been due to the students' nervousness and anxiety as they had agree to participate in this study while they were during their final exam period. At the same time students could have been affected due to their anxiousness to win a prize.

These results have important implications for the aviation industry. They suggest that airlines and governing authorities need to reconsider the ways pre-flight safety briefings are provided and adjust the content of the safety briefing and the method in which the delivery is conducted, with the aim of improvements in passengers' mood and therefore behaviour during emergencies.

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Appendix A: Experiment 1

Appendix A contains the material and stimuli that were developed in order to allow the conduct of Experiment 1.

Application Number For office use only	

The University of New South Wales

Human Research Ethics Advisory (HREA) Application Form

Instructions for applicants:
Answer all questions.
Attach any relevant documents.
Contact your school administrator for UNSW letterhead (Q7) and for the location of your School/Unit/Research Centre's central repository for the storage of collected data (Q10).
For submission requirements ie number of hardcopy and/or electronic copies please see:
Contact your HREA Panel.

Additional Instructions for student applicants:
It is required that applications from students are prepared in time for Supervisor/s to read over, suggest comments and changes, and sign before submission, otherwise the approval process will be delayed.

1. Investigator/s

School/Unit/Research Centre

Investigator/s	Title	Family Name	First Name	Work Telephone/Mobile	Email
First Investigator	Mr.	Tehrani	Morteza	0404095306	z8605289@student.unsw.edu.au
Co-Investigator/s					
Supervisor/s (Student applicants only)	Dr	Molesworth	Brett	9385 6757	b.molesworth@unsw.edu.au

2. Status of Investigator/s

☐ Academic ☑ Student

Candidate level (Student applicants only)
☐ PhD ☑ Masters ☐ PG Dip ☐ Honours ☐ Other

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3. Project Title

Does mood state affect performance in non-normal situations?

4. Project Description

Attach a description of the project including aims, hypotheses, research questions and methods on a separate page (approx 500 words). Attach a copy of sample interview questions/questionnaires/surveys and interview schedules if applicable.

5. Potential for Harm to Participants and/or Investigator/s:

Refer to the National Statement: 1.Values and Principles

Is there any potential for harm: physical, psychological, social, cultural or financial to participants and/or the investigator/s?	☑ Yes ☐ No
Are there any potential risks to participants and/or the investigator/s?	☐ Yes ☑ No
If you answered ‘Yes’ to either of these questions, please describe the potential harm/risks, estimate their probability, and explain how you will seek to minimise and/or avoid these. Due to the nature of the experiment, there is a potential for physical harm where participants may injure themselves as part of the experiment process. For example, the participant in their haste to complete the exercise might accidently fall as they try to navigate past chairs. In order to minimize the chance of this occurring, all chair spacing (seat pitch) will reflect that of a real aircraft. In addition, the exercise will be conducted on carpet and no chairs or other objects with sharp edges will be used. In terms of psychological harm, there is a small chance that the exercise might trigger an adverse reaction for some participants who have a fear of flying or who have had a bad experience flying. Therefore, participants will be informed about the nature of the experiment prior and asked if they have had experienced such an event.	

6. Selection and Recruitment of Participants

Refer to the National Statement: 4.2Children/Young people; 4.5.Mental impairment; 4.4.Dependent on medical care; 4.3Unequal relationships; 1.10 and 4.7.Collectivities; 4.7.Indigenous

Please note the term recruitment is used here to mean: select, contact and request to participate. It does not necessarily denote payment or employment.

Will participants be recruited to take part in this research?	☑ Yes ☐ No
Is there any possibility that participants will feel coerced to take part in this research?	☐ Yes ☑No
Are participants in a dependent relationship with the investigator (eg. teacher and student, friends, family)?	☐ Yes ☑No
Will participants be offered an inducement to encourage their involvement?	☑Yes ☐ No

If you answered 'Yes' to any of these questions, please describe who will be selected, how they will be contacted, and why; how issues of coercion or dependant relationships will be resolved; and/or what type of and why inducements will be offered. Please attach any advertisements or posters for recruiting participants. Mr Tehrani will recruit all participants for the research. Mr Tehrani is a research student and has no teaching responsibilities. This will be performed by providing students in the aviation program a brief during normal scheduled classes. During this brief, Mr Tehrani will inform participants about the research including the task required and the duration of the research. During the brief and at the start of the research (Appendix A – Information sheet), the students will be reminded that participation in the research is voluntary. They will also be informed that their decision to participate or not participate in the research will have no impact on their studies at UNSW. All participants will be reimbursed for their time in the form of a bookshop gift voucher. The research will take no longer than 30 minutes and students will be provided a $10 bookshop voucher.	

7. Informed Consent

Refer to the National Statement: 1.10 Respect, 2.2,2.3: Consent ; 4.4.Dependent on medical care; 3.2 Databanks ; 3.4.Tissue samples; 3.5.Genetic research

Will the investigator/s request written informed consent from participants?	☑ Yes ☐ No
If you answered 'No' please justify why not. If you answered 'Yes' please complete and attach a Participant Information Statement and Consent (PISC) form. Please note PISC forms that are not on the appropriate UNSW letterhead will not be approved by the panel. See appendix A & B	

8. Privacy

Will the investigator/s need to identify, collect, use or disclose information of a personal nature (either identifiable or potentially identifiable) about individuals without their consent (eg from Commonwealth departments or agencies, State departments or agencies, or non-government organisations)?	☐ Yes ☑No
If you answered 'Yes' to any of these questions, please complete and attach the HREA Panel Privacy Data Form	

9. Observations and Records

Refer to the National Statement: 2.3.Qualifying waiving conditions of consent

Is it necessary for the investigator/s to make recorded observations of participants (eg. audiotapes, videotapes, photographs or written notes) during this research?	☑Yes ☐ No
Is it necessary for the investigator/s to use records or database information during this research?	☐ Yes ☑ No
If you answered 'Yes' to either of these questions, please briefly explain why and how this will be done. Please note that any form of recorded observation must be outlined on the PISC form. Due to the nature of the research (examining errors during an emergency evacuation), it is necessary to capture participants' performance to examine the number of errors committed. Therefore, all participants will be videotaped. Participants will be informed about the need to record their behaviour when recruiting and in the information sheet.	

10. Confidentiality, Privacy and Anonymity

Is there any possibility of participants being inappropriately identified or confidential data being divulged during or after the research has taken place?	☐ Yes ☑ No
If you answered 'Yes' please describe the measures you will take to ensure privacy, confidentiality and anonymity are preserved.	
Please confirm that all collected research data will be stored for a minimum of 7 years in the investigator/s school/unit/research centre's central repository.	☑ Yes ☐ No
If you answered 'No' please explain why not. If you answered 'Yes' please note the room number and building where your collected research data will be stored. The collected research data will be held at: Room 209, School of Aviation, Old Main Building UNSW. The building is equipped with swipe card access, doors with key locks and under video surveillance.	

11. Deception and Debriefings

Refer to the National Statement: 2.3 <u>Qualifying and waving conditions for consent</u>

Is it necessary during the research to deceive participants?	☐ Yes ☑ No
If you answered 'Yes' please explain why and outline how this will be done. Please attach a description of your debriefing procedure for participants.	

12. Conflict of interest, including financial involvement

Refer to the National Statement: 5.4 Conflicts of Interest

Is the research being funded by an agency outside UNSW?	☐ Yes ☑ No
Is any conflict of interest (including financial gain) likely to result from this project?	☐ Yes ☑No
If you answered 'Yes' to either of these questions, please provide details and attach official documentation.	

13. Organisations other than the University of New South Wales

Are organisations other than UNSW involved in this research?	☐ Yes ☑ No
If you answered 'Yes' please provide details and attach a letter of support from the organisations.	

14. Declaration of Investigator/s

I/we apply for approval to conduct research. If approval is granted, the research will be undertaken in accordance with the information provided in this application, the protocols described in this application, and any other relevant guidelines, regulations and laws.

Investigator/s	Name	Signature	Date
First Investigator	Morteza Tehrani	Tehrani	29/07/12
Co-Investigator/s			

15. Declaration of Supervisor/s (if applicant is a student)

I/we have read over this application in its entirety and will endeavour to ensure my/our student undertakes his/her research according to all UNSW ethics protocols.

Supervisor/s	Name	Signature	Date
Supervisor	Dr. Brett Molesworth		29/07/12
Co-Supervisor			

Checklist (to be filled in by the applicant)

Required

Checked HREA website for number of hardcopies and/or electronic copies required for submission	☐ Yes ☐ No

Question	Document	

4	Project Description	☑ Yes ☐ No
14 & 15	Signature/s of all Investigator/s and Supervisor/s	☐ Yes ☐ No

Additional Attachments

Question	Document	
4	Sample interview/questionnaire/survey questions	☐ Yes ☐ No
4	Interview schedule	☐ Yes ☐ No
6	Recruiting advertisement/poster	☐ Yes ☐ No
7	Participant Information Statement and Consent (PISC) form	☑ Yes ☐ No
8	HREA Panel Privacy Data form	☐ Yes ☐ No
11	Debriefing procedure	☐ Yes ☐ No
12	Funding details	☐ Yes ☐ No
13	Letter of support from external organisation/s	☐ Yes ☐ No
	Other:	☐ Yes ☐ No

4. Project Description

Aim

The main aim of the present research is to examine the relationship between mood and behaviour in an aviation setting. Specifically, this relationship will be examined in a non-normal situation, as defined by a situation that is rarely, if at all experienced. Therefore, the present research attempts to answer the following question:

Does mood state affect performance in non-normal situations?

Method

50 students from UNSW will be recruited for the research. They will be randomly allocated to one of two groups (positive - (good) mood and negative -(bad) mood). All participants will be briefed about the research, provided an information sheet and asked to sign the consent form. Following this they will be asked to complete a Profile of Mood State (POMS; Appendix C) - short version questionnaire approximately 15 minutes prior to a cabin emergency evacuation task. Following the completion of the questionnaire, the participants will watch a pre-flight safety video including a demonstration of how to wear a life jacket in order to participate in a simulated Emergency Evacuation (e.g., emergency landing on water).

After the pre-flight safety briefing and prior to take-off, participants' mood will be manipulated by exposure to six pictures as utilised by Richards and Whittaker (1990). Group 1 will be presented with three scenic pictures to induce positive mood and group 2 will be presented with three violent pictures to induce the negative mood. During the non-normal situation, participants will be asked to leave the aircraft (mock-up) following a simulated emergency landing.

Participant performance during the evacuation process will feature as the main Dependant Variables (DV) and constitute error and time taken to evacuate the aeroplane. Participants will be required to don their life jacket due to an unprepared ditching event such as Engine Failure due to bird strikes and select the most appropriate Emergency Exit for evacuation. Participants' performance will be recorded during the simulated emergency landing. At the conclusion of the exercise, participants will be asked to complete another POMS in order to determine if their mood has been affected and will be debriefed about the study. The total time to complete the task will be no longer than 30 minutes.

Data Analysis

Dependent variables include, error and time to complete task. Relationships between time and mood will be examined as well as differences between error rate and mood.

References:

Richards, A. & Whittaker, T. M. (1990). Effects of anxiety and mood manipulation in auto biographical memory. *British Journal of Clinical Psychology,* 29, 145-153.

UNSW

Approval No: 08/2012/22

THE UNIVERSITY OF NEW SOUTH WALES

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM

Does mood state affect performance in non-normal situations?

You ___________________ are invited to participate in a study titled '*Does mood state affect performance in non-normal situations?'*. I, Morteza Tehrani hope to learn about the interrelationship between mood and performance in the non-normal situations within aviation. This study will provide valuable safety information which can be utilised in any socio-technical environment. You are selected as a possible participant in this study because of your interest in aviation.

If you decide to participate, you will be asked to participate in a mock emergency evacuation of an aircraft cabin. Prior to this you will be asked to complete a brief questionnaire, followed by the short video and then the emergency evacuation. The total time to complete the study will take no longer than one hour.

Since the nature of the task is an emergency evacuation, it is expected that you will perform the task in a hurry. Under such circumstances there is a small risk that you may physically injury yourself. However, in order to ensure this risk is kept to a minimum, the seating arrangements are similar to those on a normal aircraft and no sharp or danger objects will be present.

The personal benefits for you participating in the research are limited to the receipt of a $20 bookshop gift voucher. From the wider community's perspective, the expected benefit of the research is improved understanding the relationship between mood and performance in non-normal situations.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission, except as required by law. If you give us your permission by signing this document, we plan to publish the results in journals and conference proceedings. In any publication, information will be provided in such a way that you cannot be identified.

Complaints may be directed to the Ethics Secretariat, The University of New South Wales, SYDNEY 2052 AUSTRALIA (phone 9385 4234, fax 9385 6648, email ethics.sec@unsw.edu.au). Any complaint you make will be investigated promptly and you will be informed out the outcome.

You will be able to obtain a summary of the research results on UNSW Aviation's home web page under 'News'.

Your decision whether or not to participate will not prejudice your future relations with the University of New South Wales. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without prejudice.

If you have any questions, please feel free to ask us. If you have any additional questions later, Mr Morteza Tehrani (z8605289@student.unsw.edu.au Ph 040 409 5306 will be happy to answer them.

You will be given a copy of this form to keep.
THE UNIVERSITY OF NEW SOUTH WALES *(AND THE OTHER PARTICIPATING ORGANISATION[S])*

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM (continued)

Does mood state affect performance in non-normal situations?

You are making a decision whether or not to participate. Your signature indicates that, having read the information provided above, you have decided to participate.

…………………………………………………	…………………………………………………
Signature of Research Participant	Signature of Witness
…………………………………………………	…………………………………………………
(Please PRINT name)	(Please PRINT name)
…………………………………………………	…………………………………………………
Date	Nature of Witness

REVOCATION OF CONSENT

Does mood state affect performance in non-normal situations?

I hereby wish to **WITHDRAW** my consent to participate in the research proposal described above and understand that such withdrawal **WILL NOT** jeopardise any treatment or my relationship with The University of New South Wales, *(other participating organisation[s] or other professional[s])*.

…………………………………………………	…………………………………………………
Signature	Date

…………………………………………………
Please PRINT Name

The section for Revocation of Consent should be forwarded to Mr Morteza Tehrani, School of Aviation UNSW Sydney NSW 2052.

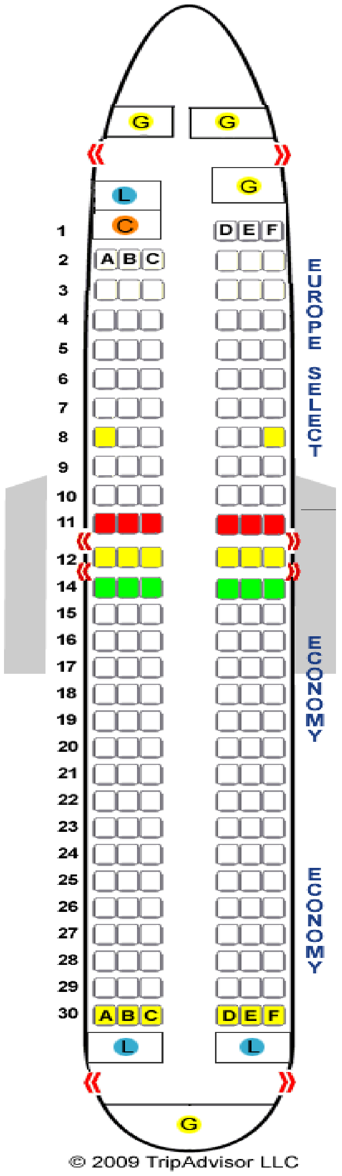
List of required items for the Experiment.

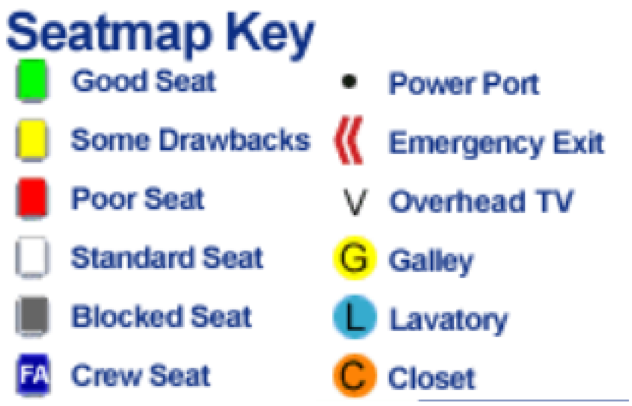
1. Video Camera: capable of continuous videotaping for at least one hour plus option for further memory.
2. Camera tripod
3. 20 meter Extension cord
4. Multiple power outlet (Socket) with safety switch
5. Overhead projector
6. Overhead projector stand
7. Projecting Screen
8. Computer cables – HDMI and VGA
9. External speakers and connecting cables to computer
10. 9 seats with armchairs resembling economy class rows 10 (Non-exit), 11exit row) and 12(Exit Row) of 737 – 800
11. Life Jacket
12. Cardboards, scissors, sticky Tapes, rulers, stapler and coloured whiteboard markers
13. Measurement tape

737-800

Standard Economy

- 180 economy seats / 30 rows / 6 seats per row.
- 3 toilets (1 front / 2 rear).
- 8 exits (2 front / 4 overwing / 2 rear).
- Seat width: Approx 17 inches (43 cms).
- Seat pitch: 31-33 inches for standard rows; 38-39 inches for exit row.




Seatmap Key
Good Seat
Some Drawbacks
Poor Seat
Standard Seat
Blocked Seat
FA
Crew Seat
Power Port
Emergency Exit
V
Overhead TV
G
Galley
L
Lavatory
C
Closet


EMERGENCY
EXIT

UNSW
THE UNIVERSITY OF NEW SOUTH WALES

Research Participants Needed

Effect of Mood on Performance in Non-normal Situations

The School of Aviation needs volunteers to participate in a research experiment for in-flight emergencies.

The Task:

- Fill out Questionnaire
- Watch a short Video
- Conduct Emergency Evacuation
- Provide Feedback

Your Benefits

- Become familiar with the research experiment
- Improved understanding of the relationship between mood and performance in non-normal conditions
- Receive the final copy of the study
- Receive $10.00 bookshop gift voucher

Interested? What Next?

Contact Morteza Tehrani

Phone: 0404095306
Email: z8605289@student.unsw.edu.au
OR: mtehrani@ozemail.com.au

3 Pleasant Pictures



3 Unpleasant Pictures


Post Experiment Questions

Subject's Initials _______

Date of Birth _______

Date _______

Please state what you were thinking just before the Emergency Evacuation.

1.

2.

3.

Delta Pre-flight Safety Briefing

http://www.youtube.com/watch?v=MgpzUo_kbFY

Profile of Mood States - POMS

Subject's Initials
Birth date ________ Date _
Subject Code No. ________

Directions: Describe HOW YOU FEEL RIGHT NOW by checking one space after each of the words listed below:

FEELING	Not at all	A little	Mod.	Quite a bit	Extremely
Friendly	1	2	3	4	5
Tense	1	2	3	4	5
Angry	1	2	3	4	5
Worn Out	1	2	3	4	5
Unhappy	1	2	3	4	5
Clear-headed	1	2	3	4	5
Lively	1	2	3	4	5
Confused	1	2	3	4	5
Sorry for things done	1	2	3	4	5
Shaky	1	2	3	4	5
Listless	1	2	3	4	5
Peeved	1	2	3	4	5
Considerate	1	2	3	4	5
Sad	1	2	3	4	5
Active	1	2	3	4	5
On edge	1	2	3	4	5
Grouchy	1	2	3	4	5
Blue	1	2	3	4	5
Energetic	1	2	3	4	5
Panicky	1	2	3	4	5
Hopeless	1	2	3	4	5
Relaxed	1	2	3	4	5
Unworthy	1	2	3	4	5
Spiteful	1	2	3	4	5
Sympathetic	1	2	3	4	5
Uneasy	1	2	3	4	5
Restless	1	2	3	4	5
Unable to concentrate	1	2	3	4	5
Fatigued	1	2	3	4	5
Helpful	1	2	3	4	5
Annoyed	1	2	3	4	5
Discouraged	1	2	3	4	5
Resentful	1	2	3	4	5

Nervous	1	2	3	4	5
Lonely	1	2	3	4	5
Miserable	1	2	3	4	5
Muddled	1	2	3	4	5
Cheerful	1	2	3	4	5
Bitter	1	2	3	4	5
Exhausted	1	2	3	4	5
Anxious	1	2	3	4	5
Ready to fight	1	2	3	4	5
Good-natured	1	2	3	4	5
Gloomy	1	2	3	4	5
Desperate	1	2	3	4	5
Sluggish	1	2	3	4	5
Rebellious	1	2	3	4	5
Helpless	1	2	3	4	5
Weary	1	2	3	4	5
Bewildered	1	2	3	4	5
Alert	1	2	3	4	5
Deceived	1	2	3	4	5
Furious	1	2	3	4	5
Effacious	1	2	3	4	5
Trusting	1	2	3	4	5
Full of pep	1	2	3	4	5
Bad-tempered	1	2	3	4	5
Worthless	1	2	3	4	5
Forgetful	1	2	3	4	5
Carefree	1	2	3	4	5
Terrified	1	2	3	4	5
Guilty	1	2	3	4	5
Vigorous	1	2	3	4	5
Uncertain about things	1	2	3	4	5
Bushed	1	2	3	4	5

Flight Status Information for Participants

Flight Status

Departure: Sydney

Destination: Melbourne

Flight: B737 – 800

Photograph Rating

Subject's Initials _______

Date of Birth _______

Date _______

Please rate each photograph.

4. Did photographs attract your attention?

☐ Yes ☐ No

5. Did you see professionalism in the photographs?

☐ Yes ☐ No

6. Photographs were:

☐ Pleasant ☐ Unpleasant

In flight Emergency Scenario

Information:
Aircraft: 737 – 800
Altitude: 500 feet
Emergency Situation: Double Engine Failure due to bird strikes
Position: straight after take-off, overwater (not able to return and land), expected to ditch within seconds

Announcement:
Nil

Ditching:
Evacuate, Evacuate, Evacuate – High Heels Off, Come this way, Come This way

Flight Status

Aircraft Type: 737 – 800
Departure: Sydney
Destination: Melbourne
Departure: towards south – overwater after take-off

Student Information

Nr.	First Name	Last Name	Student Nr.	Phone Nr.	Email Address	Remarks
Eg.	Joe	Smith	Z8686868	0404095306	8686868@student.unsw.edu.au	Call me after 8 PM
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
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39						
40						
41						
42						
43						
44						
45						
46						
47						
48						
49						
50						

Cabin Evacuation Error Checklist

Did the subject:

1. forget the life jacket and was to evacuate the aircraft without it? YES ☐ NO ☐
2. know the location of the life jacket – i.e.,: able to find it? ☐ YES ☐ NO
3. pull out the life jacket? YES ☐ NO ☐
4. Put on the life Jacket correctly - placing the rounded side of the Jacket behind the head and the squared side in front? YES ☐ NO ☐
5. tie the strap properly – putting the strap around the Waist circumference? YES ☐ NO ☐
6. attempt to inflate the life jacket prior to exiting the aircraft? YES ☐ NO ☐
7. attempt to carry any personal items during the evacuation – i.e.,: bags, laptop computer, etc.? YES ☐ NO ☐
8. choose the nearest emergency exit? YES ☐ NO ☐
9. have any mishap during evacuation – i.e.,: tripped, slipped, lose balance? YES ☐ NO ☐
10. ask any questions regarding steps 1-8 after commencing evacuation – "Evacuate, Evacuate, Evacuate"? YES ☐ NO ☐

Note:

The entire process from the commencement of evacuation until completion took ____________seconds.

Police Pursuits and Fatal Injuries

POLICE PURSUITS

YEAR	PURSUITS	ABORTED	%	COLLISIONS	%	FATALS	%
2002	545	85	16%	57	10%	5	0.9%
2003	509	94	18%	48	9%	6	1.2%
2004	484	123	25%	40	8%	2	0.4%
2005	719	183	25%	57	8%	3	0.4%
2006	548	135	25%	37	7%	3	0.5%
2007	597	121	20%	33	6%	0	0%
2008	649	169	26%	50	8%	2	0.3%
2009	630	218	35%	88	14%	2	0.3%
2010	659	261	40%	92	14%	1	0.2%
2011	721	314	44%	102	14%	3	0.4%

SOURCE: VICTORIA POLICE

Air New Zealand Safety Video Questionnaire

Task

Please write all you can remember from the Air New Zealand safety *video.* Please use the sub-headings below to assist in this process.

Baggage

Seat belt

Oxygen

Brace Position

Life Jacket

Non Smoking

Lights

Exits

Electronic Devices

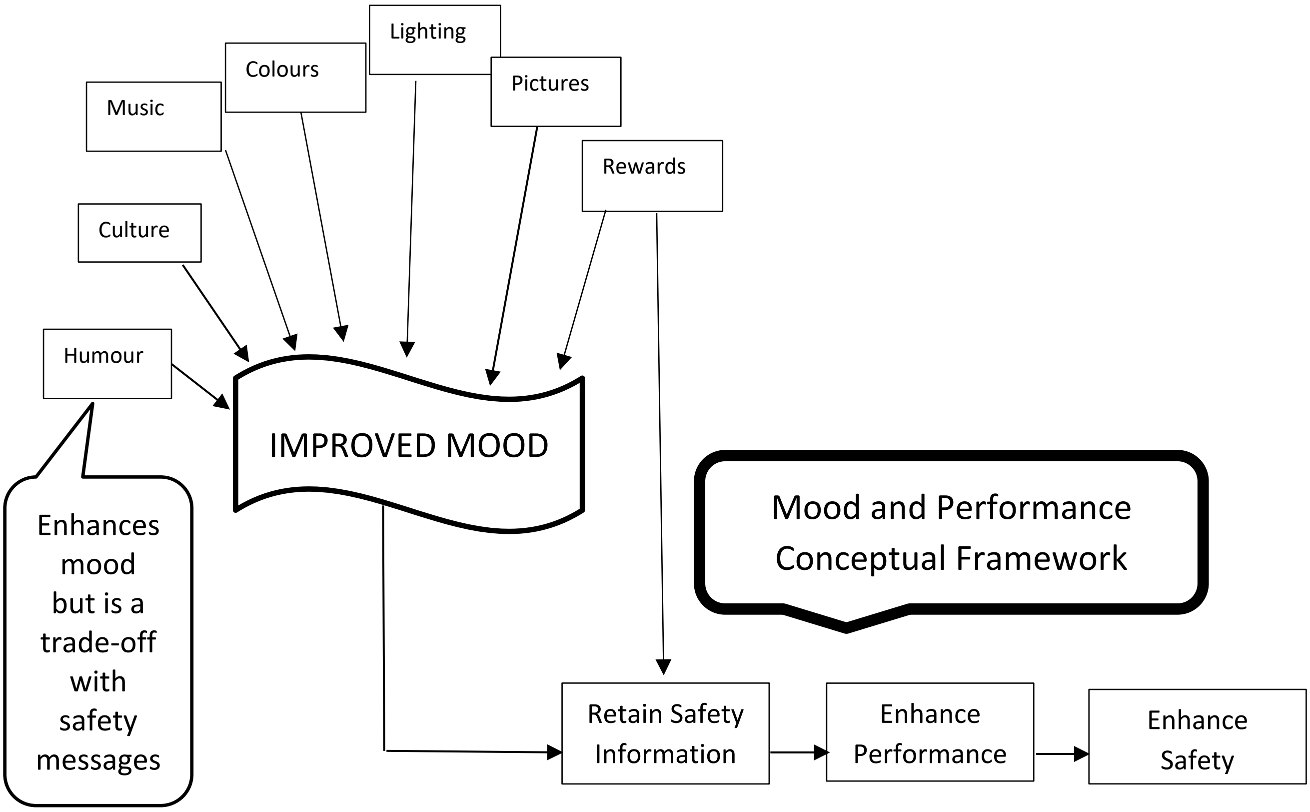
Seat Position

Other

Appendix B: Experiment 2

Appendix B contains the material and stimuli that were developed in order to allow the conduct of Experiment 2.

(Proposal's Conceptual Framework)



Air NZ – Disco Inspired

What is the message trying to be conveyed to you?

Baggage		
Stretch it out and lose that baggage. Stretch it up to the overhead locker or slide in under the seat in front of you. Stretch and slide yeh. You're a giraffe	How to place your baggage Where to place your baggage	2
		2

Seat belt		
Now it is seat belt time. When the seat belt light comes on, buckle it in. Grab click pull	What needs to be done now How to buckle the seat belt	2
Nice and snug, low across the hips, but not too tight and to undo your belt, just lift the flap	How the seat belt should feel and location How to undo the seat belt	4
Remember you must follow crew instructions and lighted signs.	Behaviour on board re crew and lights	5
		7

Oxygen		
If your oxygen mask drops down, it is time to take a breather.	What to do when oxygen mask drops	1
Pull it down over your nose and mouth, pull the elastic and pull it tight and breath normally. And remember put your mask on first before you help others.	How to operate the oxygen mask When to help others re oxygen mask	3
Don't worry if the bag is feeling a little flat, the oxygen will flow automatically.	How oxygen flows through mask	4
		11

Brace Position	Message	
Okay now for the recommended brace positions, if there is an emergency during take-off and landing, if you could reach, just lean and brace on the seat in front of you, or this is one of my favourite, it is called the duck;	How to brace during an emergency	1

flat feet, elbows outside, hands on your head, and duck on down.		
		12

Life Jacket	Message	
Now let's see where your life jackets are at? Down here, under your seat. Okay everybody, do what I do, out of the pouch, over the head, and clip it together. Get those arms moving.	Location of life jackets How to place the life jackets on	2
This red tag inflates your jacket. Pull it when you step step step outside.	Purpose of the red tag on life jacket When to pull the red tag	4
If your life jacket is short of air, grab the mouth piece here and blow and blow. Ye you are pumping it up.	How to insert more air in your life jacket	5
And if you have an infant on board, the crew have a jacket for your baby.	How to get a life jacket for an infant	6
		18

Non Smoking		
And sorry, this flights is strictly non-smoking. It is a safety hazard so the captain says lets kick butt.	Status of flight re smoking Smoking is a safety hazard	2
		20

Lights		
If the lights go out in an emergency, and the lights come on down here, its time to move. Look around to see if anyone needs your help.	What to do when the lights are out Help others if they require	2
These lights lead you to the exit.	Purpose of lights	3
Come on everyone lets pony	Behave in a particular way	4
		24

Exits		
Your crew are now pointing out the exits, the nearest one could be behind you.	Crew informing where the exits are Potential location of exits	2

Stop count the rows and see two, three, four.	Method for determining where the exits are	3
		27

Electronic Items	Message	
Stop broadcasting buddy	Telling someone to stop using electronic devices	1
Electronic devices, even the cool ones can interfere with our systems during take-off and landing so switch it off and if you switch it to flight mode first and turn it off you can use it later in the flight. then off	Any electronic device can interfere with the system. What to do with electronic devices	2
		29

Seat Position		
During take-off and landing, here is what we do. Tray tables back, seats upright, seat belt on, fantastic.	What to do during take-off and landing	1
		30

Other	Message	
If you need more information it on your safety information card.	Where to get more information	1
Now your fit to fly.	You are ready	2
The only way is up.	Where you are going	3
	Type of animal you are	4
		34

Air NZ – Boring Inspired

What is the message trying to be conveyed to you?

Baggage	Message	Score
Please watch this safety demo as it is specific to this aircraft.	Safety message specific to this aircraft	1
First make sure you cabin bags are safely stoved either in overhead lockers or under the seat in front of you.	Stove bags overhead or stove bags under seat	3
		3

Seat belt	Message	Score
Whenever the seatbelt signs are switched on, return to your seat and do up the seat belt.	Return to your seat when the sign is on.	1
Ensure it is tight and fits low across your hips.	How to fasten the seat belt correctly	2
You are advised to keep your seat belt fasten when seated during the flight.	Recommendation for use of the seat belt	3
To release the seat belt, simply release the lever.	How to open the seat belt	4
		7

Oxygen	Message	Score
Should oxygen masks drop from the overhead panel, activate your mask by pulling it towards you.	How to activate the oxygen mask when it drops before you	2
Oxygen will flow through the mask, even though the bag may not inflate.	How oxygen flows	3
Place the mask over your nose and mouth and adjust the headband for a secure fit	How to wear the mask securely	4
Make sure your own mask is fitted before assisting others.	Do not help others before fitting correctly your own mask.	5
		12

Brace Position	Message	Score
If an emergency occurs during takeoff and landing, adopt the recommended brace position	How to adopt your position in emergencies during takeoff and landings.	1
Make sure your feet are flat on the floor, lean forward as far as possible with your hands on top of your head, elbows against your thighs, otherwise if you can reach the seat in front of you brace yourself against it.	How to brace by leaning forward OR against the seat front	3
		15

Life Jacket	Message	Score
Your life jacket is under your seat or under the centre armrest	Location of the L.J.	1
Remove it from the pouch	Take it off the pouch	2
Put your L.J. on while seated	When to put it on	3
Clip the waistband together and pull it tight.	How to wear it	4
Only inflate the L.J. as you exit the aircraft by pulling down on the red tag	When to inflate it	5
If your L.J. does not fully inflate, use the mouthpiece.	How to get more air into it	6
		21

Non Smoking	Message	Score
Smoking is a hazard and is not permitted at anytime , anywhere on the aircraft	Smoking is hazard and not allowed under any condition	2
		23

Lights	Message	Score
In an emergency evacuation, escape path lighting will help guide you	You will be guided by the escape path lighting during emergency	1
		24

Exits	Message	Score
Your crew now indication emergency exits	The crew showing the exits	1

Please note, your nearest exit maybe behind you.	Chose the nearest exit. It may be behind you	3
Count the rows of seats to the exit.	How to remember finding the exit	4
		28

Electronic Items	Message	Score
Electronic devices may interfere with the aircraft systems.	Electronic devices and their interferences with aircraft systems	1
Ensure your phone is turned off at all times and turn off all electronic devices during takeoff and landing.	When to turn of phone and other devices	3
For information about the electronics that may be used during the flight, refer to the safety card or check with your crew.	Refer to safety card for more info or check with crew	5
		33

Seat Position	Message	Score
To prepare for takeoff, ensure your seatback is upright. Make sure your tray-table is latched securely, your footrest if fitted, is folded away and your seat belt is tightly fastened.	How to prepare for takeoff	1
		34

Air NZ – Hobbit Inspired

What is the message trying to be conveyed to you?

Baggage	Message	Score
About safety	Refers to safety	1
Keep a sharp eye on the briefing	Concentrate on this brief	2
Hideaway belonging either above or below the seat before you	Hide away your bags	3
		3

Seat belt	Message	Score
All passengers must keep an eye on the signs and follow crews instructions	Look at the signs Follow crews instructions	2
If the seat belt sign is on set yourself down and fasten your seat belts	Fasten your seatbelts when the sign is on	3
Be sure that is not across your hips and not as tight as you feel losing your leg	How to correctly tighten the seat belt	4
Special instructions for your seat belts in your seat pocket	For special instructions refer to the card in your seat pocket	5
Recommended to fasten your seat belt throughout the journey	Recommendation for seat belt during flight	6
		9

Oxygen	Message	Score
If an oxygen mask falls before you simply pull on the mask, place it on your nose and mouth and tighten by elastics by both sides. Oxygen flows automatically.	How to wear the oxygen mask when you see it drops before you. How the oxygen flows automatically.	3
If there is young ones around you be sure to put your mask on before helping them. Keep an eye that maybe others who need your help.	Help yourself before helping others. Keep an eye out for others that may need your help	5
		14

Brace Position	Message	Score

Should emergency occur during takeoff and landing, place your hands on your head and keep your feet flat on the floor.	Brace yourself during emergency	1
You can always brace yourself on the seat in front of you.	Other brace option	2
In business and primer sit upright , put your hands together.	Brace position in business and primer economy	3
		17

Life Jacket	Message	Score
In primer economy and economy the life jackets are below your seat	Location of the L.J. in economy and premier economy	1
The sky couch has it in the top of the leg rest	Location LJ in sky couch	2
If seated in business premier, LJ is besides you.	Location LJ in bus premier	3
Take it from the bag, place it over your head, click sharps together and tighten it.	Instructions of where take it from how to wear it.	4
Red tab inflates the jacket	What part is inflating the jacket	5
Inflate when you leave the AC	When to inflate the jacket	6
If you need more inflation, simply blow the red piece.	How to get more air into the life jacket	7
Provide life jackets for the very young, if the need arises.	LJ are provided for the young also	8
		25

Non Smoking	Message	Score
Smoking is not allowed anywhere on the AC as it is a fire hazard	No smoking AC because of Fire danger	2
		27

Lights	Message	Score
Should you need lights in darkness to help you find your way, the escape power lights lead you to an exit.	If you follow the escape lights you will reach to an exit	1
		28

Exits	Message	Score

If you need to evacuate, support fellow passengers that may need help.	support others that may need your help during if evacuating	1
Your noble crew will lead you to the exit.	Follow crew instructions for emergency exits	2
The nearest exit may be behind you. Count the number of rows to the nearest exit.	Locate the nearest exit as it may be behind you	4
Your will find more information in emergency card in your seat pocket.	For more information refer to the emergency card which is located on the seat pocket	5
		33

Electronic Items	Message	Score
Please power off the electronic devices during takeoff and landing	All electronic devices must be off for takeoff and landing	1
Electronic devices such as mobile phone can interfere with the aircraft systems and must not be used in flight unless in the flight mode.	They interfere with aircraft systems and can only be used during flight if in flight mode.	3
		36

Seat Position	Message	Score
Finally for takeoff, tray table up, seat upright, leg rests down, window shades up and arm rests lowered and fasten your seat belts entertainment and remote control put away for takeoff	Position for take off	1
		37

Other	Message	Score
Seat back and relax	complement	1
		38

		1	2	3	4	5	6	7	8		9	10	11	12	13	14		15	16	17	18	19	20
	POMS **Before** Video	**DEPRESSION**								MEAN	**VIGOR**						MEAN	**ANGER**					
		Unhappy	Sad	Blue	Hopeless	Discouraged	Miserable	helpless	worthless		Lively	Active	Energetic	Cheerful	Full of pep	Vigorous		Angry	Peeved	Annoyed	Grouchi	Resentful	Bitter
1	Boring Video	0	0	0	0	0	2	0	0	**0.3**	0	1	1	1	1	0	**0.7**	0	0	1	1	1	0
2	Boring Video	0	0	0	0	0	0	0	0	**0.0**	2	2	2	2	0	2	**1.7**	0	0	0	0	0	0
3	Boring Video	0	0	0	0	0	0	0	0	**0.0**	2	1	2	2	1	0	**1.3**	0	0	0	0	0	0
4	Boring Video	0	0	0	0	0	0	0	0	**0.0**	3	2	3	3	1	0	**2.0**	0	0	0	0	0	0
5	Boring Video	0	0	0	0	0	0	0	0	**0.0**	4	3	3	4	3	0	**2.8**	0	0	0	0	0	0
6	Boring Video	1	1	2	1	0	0	0	0	**0.6**	3	2	0	3	2	1	**1.8**	0	1	1	1	0	0
7	Boring Video	0	0	0	0	0	0	0	0	**0.0**	2	2	2	2	0	0	**1.3**	0	0	0	0	0	0
8	Boring Video	2	0	0	1	0	0	0	1	**0.5**	2	1	2	1	1	0	**1.2**	0	0	0	0	0	0
9	Boring Video	1	0	0	0	0	0	0	0	**0.1**	0	0	0	0	0	0	**0.0**	0	0	0	1	0	0
10	Boring Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0
11	Boring Video	0	0	1	0	2	1	0	0	**0.5**	2	1	2	2	0	1	**1.3**	0	1	0	0	1	0
12	Boring Video	2	2	2	1	2	2	3	1	**1.9**	2	3	2	1	2	1	**1.8**	3	1	2	2	1	2
13	Boring Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	2	0	0
14	Boring Video	0	0	0	0	3	0	0	0	**0.4**	2	1	1	2	0	0	**1.0**	0	0	1	2	2	0
15	Boring Video	0	0	0	1	0	0	0	0	**0.1**	1	3	2	0	3	2	**1.8**	0	0	1	0	0	0
16	Boring Video	0	0	0	0	0	0	0	0	**0.0**	2	0	1	2	1	0	**1.0**	0	0	0	1	0	0
17	Boring Video	0	0	0	2	1	0	0	0	**0.4**	2	1	1	2	1	2	**1.5**	0	0	0	0	0	0
18	Boring Video	1	0	0	0	0	0	0	0	**0.1**	2	2	2	2	1	1	**1.7**	0	0	0	0	0	0
19	Boring Video	0	0	0	0	2	0	0	2	**0.5**	0	0	0	0	0	0	**0.0**	0	2	0	0	0	0
20	Boring Video	1	0	0	0	0	0	0	0	**0.1**	1	1	2	1	0	1	**1.0**	0	0	0	0	0	0
21	Boring Video	1	1	1	3	2	2	1	1	**1.5**	2	3	2	2	1	1	**1.8**	0	1	0	1	1	0
22	Boring Video	1	0	0	1	1	0	0	0	**0.4**	0	0	2	1	0	0	**0.5**	0	0	1	0	0	0
23	Boring Video	0	0	0	0	0	0	0	0	**0.0**	1	3	2	3	2	0	**1.8**	0	0	1	1	0	0
24	Boring Video	0	0	0	0	0	0	0	0	**0.0**	2	3	3	3	1	0	**2.0**	0	0	0	1	0	0
25	Boring Video	0	0	0	0	0	0	0	0	**0.0**	3	2	2	3	2	2	**2.3**	0	0	0	0	0	0
26	Boring Video	1	0	2	1	1	2	1	1	**1.1**	2	3	3	3	2	1	**2.3**	0	2	1	2	2	2
27	Boring Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0

Total Mood Disturbance (TMD) = (Anger +Confusion+Dipression+Fatigue + Tension + (24 - Vigor)

McNair, D. M., Lorr, M. & Droppleman, L. F. (1971) *EdITS Manual for the Profile of Mood States*, San Diego, CA, Educational and Industrial Testing Service.

		1	2	3	4	5	6	7	8		9	10	11	12	13	14		15	16	17	18	19	20
	POMS **After** Video	**DEPRESSION**								MEAN	**VIGOR**						MEAN	**ANGER**					
		Unhappy	Sad	Blue	Hopeless	Discouraged	Miserable	helpless	worthless		Lively	Active	Energetic	Cheerful	Full of pep	Vigorous		Angry	Peeved	Annoyed	Grouchi	Resentful	Bitter
1	Boring Video	1	0	0	0	1	1	0	0	**0.4**	0	1	1	0	1	0	**0.5**	0	0	0	0	0	0
2	Boring Video	0	0	0	0	0	0	0	0	**0.0**	2	1	2	1	0	1	**1.2**	0	0	0	0	0	0
3	Boring Video	0	0	0	0	0	0	0	0	**0.0**	2	1	0	0	0	0	**0.5**	0	0	0	0	0	0
4	Boring Video	0	0	0	0	0	0	0	0	**0.0**	0	1	1	0	0	0	**0.3**	0	0	0	0	0	0
5	Boring Video	0	3	3	0	0	0	0	0	**0.8**	3	0	0	3	2	0	**1.3**	0	0	0	0	0	0
6	Boring Video	1	1	1	0	2	1	0	1	**0.9**	1	2	1	2	0	0	**1.0**	0	0	1	0	1	0
7	Boring Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	0	0	0	**0.5**	0	0	0	0	0	0
8	Boring Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	2	1	0	**1.0**	0	0	0	0	0	0
9	Boring Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0
10	Boring Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0
11	Boring Video	0	1	1	1	2	2	1	2	**1.3**	0	0	0	0	1	1	**0.3**	0	1	3	2	1	2
12	Boring Video	2	2	2	2	2	2	2	1	**1.9**	1	1	1	1	1	1	**1.0**	2	2	2	2	2	2
13	Boring Video	0	0	0	0	0	0	0	0	**0.0**	0	2	1	0	1	0	**0.7**	0	0	0	0	0	0
14	Boring Video	3	1	1	1	3	1	0	0	**1.3**	0	0	0	0	0	0	**0.0**	2	1	3	2	3	3
15	Boring Video	0	0	0	0	0	0	0	0	**0.0**	1	1	2	0	2	1	**1.2**	0	0	0	0	0	0
16	Boring Video	0	0	0	0	0	0	0	0	**0.0**	0	1	0	0	1	0	**0.3**	0	0	0	0	1	0
17	Boring Video	0	0	0	0	1	0	0	0	**0.1**	2	1	2	2	1	1	**1.5**	0	0	0	0	0	0
18	Boring Video	1	0	0	0	0	0	0	0	**0.1**	1	1	1	1	1	0	**0.8**	0	0	0	0	0	0
19	Boring Video	1	0	0	0	2	0	2	1	**0.8**	0	1	1	0	0	0	**0.3**	1	2	1	0	0	0
20	Boring Video	0	1	1	0	0	0	0	0	**0.3**	1	0	0	1	0	1	**0.5**	0	1	0	0	0	0
21	Boring Video	1	1	1	1	1	2	2	2	**1.4**	1	2	2	1	1	2	**1.5**	0	3	0	1	3	0
22	Boring Video	1	0	0	0	0	0	0	0	**0.1**	0	1	0	1	0	0	**0.3**	0	0	0	0	0	0
23	Boring Video	0	0	0	0	0	0	0	0	**0.0**	3	2	2	2	2	0	**1.8**	0	0	0	0	0	0
24	Boring Video	0	0	0	0	0	0	0	0	**0.0**	2	1	1	1	1	0	**1.0**	0	0	0	1	0	0
25	Boring Video	0	0	0	0	0	0	0	0	**0.0**	2	2	2	3	2	1	**2.0**	0	0	1	0	0	0
26	Boring Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0
27	Boring Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0

21		22	23	24	25	26	27		28	29	30	31	32		33	34	35	36	37		
	MEAN	TENSION						MEAN	CONFUSION					MEAN	FATIGUE					MEAN	TI
Furious		Tense	On edge	Uneasy	Restless	Nervous	Anxious		Confused	Unable to concentrate	Bewildered	Forgetful	Uncertain		Worn out	Fatigued	Exhausted	Weary	Bushed		Be
0	**0.4**	1	3	1	1	0	1	**1.2**	0	1	0	1	1	**0.6**	3	4	4	0	0	**2.2**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	1	0	0	0	0	**0.2**	
0	**0.0**	1	0	0	0	0	0	**0.2**	0	2	0	0	0	**0.4**	1	2	1	0	0	**0.8**	
0	**0.0**	0	1	0	2	0	0	**0.5**	0	3	0	0	0	**0.6**	3	4	4	0	0	**2.2**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
1	**0.6**	0	1	1	1	1	1	**0.8**	1	3	1	2	1	**1.6**	1	2	2	1	1	**1.4**	
0	**0.0**	0	2	0	3	0	0	**0.8**	0	1	0	0	0	**0.2**	3	2	3	0	0	**1.6**	
0	**0.0**	2	0	1	2	1	1	**1.2**	1	1	1	0	1	**0.8**	2	1	1	2	1	**1.4**	
0	**0.1**	0	1	1	1	0	0	**0.5**	0	0	0	0	1	**0.2**	2	2	1	0	1	**1.2**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
0	**0.3**	1	0	1	0	1	1	**0.7**	1	1	0	1	1	**0.8**	1	1	0	0	1	**0.6**	
1	**1.7**	3	2	1	1	1	2	**1.7**	1	2	1	1	2	**1.4**	3	3	3	1	1	**2.2**	
0	**0.3**	0	0	0	3	0	0	**0.5**	1	0	0	0	0	**0.2**	3	4	3	2	2	**2.8**	
0	**0.7**	2	3	1	3	1	0	**1.7**	0	3	0	3	2	**1.6**	3	4	1	1	0	**1.8**	
0	**0.1**	1	1	1	0	1	1	**0.8**	0	1	0	1	1	**0.6**	0	2	1	0	1	**0.8**	
0	**0.1**	1	1	0	2	1	1	**1.0**	0	2	0	1	0	**0.6**	1	1	1	1	0	**0.8**	
0	**0.0**	1	2	1	0	0	2	**1.0**	1	0	1	0	2	**0.8**	1	1	0	1	0	**0.6**	
0	**0.0**	2	0	0	0	0	0	**0.3**	0	1	0	0	0	**0.2**	1	2	1	0	0	**0.8**	
0	**0.3**	0	3	0	0	0	0	**0.5**	3	2	0	0	0	**1**	3	3	2	0	4	**2.4**	
0	**0.0**	0	1	2	1	0	0	**0.7**	0	1	0	1	0	**0.4**	2	2	0	1	0	**1.0**	
0	**0.4**	2	1	1	2	1	1	**1.3**	3	2	0	2	2	**1.8**	2	1	2	1	1	**1.4**	
0	**0.1**	0	1	0	0	1	1	**0.5**	1	3	0	0	1	**1.0**	1	2	1	0	0	**0.8**	
0	**0.3**	0	1	1	1	0	0	**0.5**	2	3	0	3	2	**2.0**	1	4	4	0	3	**2.4**	
0	**0.1**	0	1	0	0	0	0	**0.2**	0	0	0	0	0	**0.0**	1	1	1	0	0	**0.6**	
0	**0.0**	1	1	0	0	0	0	**0.3**	1	0	1	0	2	**0.8**	2	2	1	2	1	**1.6**	
1	**1.4**	2	2	2	1	1	1	**1.5**	2	1	2	0	0	**1.0**	1	2	2	1	1	**1.4**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	1	0	0	0	**0.2**	1	0	1	0	0	**0.4**	

21		22	23	24	25	26	27		28	29	30	31	32		33	34	35	36	37		
	MEAN	TENSION						MEAN	CONFUSION					MEAN	FATIGUE					MEAN	TI
Furious		Tense	On edge	Uneasy	Restless	Nervous	Anxious		Confused	Unable to concentrate	Bewildered	Forgetful	Uncertain		Worn out	Fatigued	Exhausted	Weary	Bushed		Af
0	**0.0**	1	1	0	1	0	0	**0.5**	0	1	0	0	1	**0.4**	3	4	4	0	0	**2.2**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	1	1	0	1	0	**0.6**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	1	0	1	0	**0.4**	0	2	0	0	0	**0.4**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	3	0	0	0	**0.6**	1	3	4	1	0	**1.8**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	1	0	0	0	**0.2**	0	0	0	0	0	**0.0**	
0	**0.3**	1	1	0	1	1	0	**0.7**	0	3	0	2	2	**1.4**	2	3	3	0	0	**1.6**	
0	**0.0**	0	1	0	3	0	0	**0.7**	0	3	0	2	0	**1.0**	3	3	2	1	0	**1.8**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	1	**0.2**	0	1	1	1	1	**0.8**	
0	**0.0**	0	0	1	1	0	0	**0.3**	0	1	0	0	0	**0.2**	1	1	0	0	0	**0.4**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
0	**1.3**	3	2	1	0	2	2	**1.7**	1	2	1	1	2	**1.4**	1	2	1	1	1	**1.2**	
2	**2.0**	2	2	2	1	1	1	**1.5**	1	2	1	1	2	**1.4**	3	3	3	2	2	**2.6**	
0	**0.0**	0	1	0	0	0	0	**0.2**	1	1	0	1	1	**0.8**	2	2	2	2	0	**1.6**	
0	**2.0**	3	2	3	3	0	0	**1.8**	3	4	3	2	3	**3.0**	3	4	3	4	0	**2.8**	
0	**0.0**	1	0	0	2	0	0	**0.5**	0	0	0	0	0	**0.0**	2	1	2	1	0	**1.2**	
0	**0.1**	1	1	0	2	1	1	**1.0**	0	2	1	1	1	**1.0**	2	1	1	2	0	**1.2**	
0	**0.0**	0	1	1	0	1	1	**0.7**	0	0	0	2	1	**0.6**	0	1	1	1	0	**0.6**	
0	**0.0**	0	0	0	1	0	0	**0.2**	0	2	0	1	0	**0.6**	1	2	1	0	1	**1.0**	
0	**0.6**	1	0	1	1	0	0	**0.5**	2	3	0	3	2	**2**	2	3	1	0	1	**1.4**	
0	**0.1**	2	2	2	0	1	1	**1.3**	0	2	0	0	1	**0.6**	2	2	1	1	0	**1.2**	
1	**1.1**	1	3	2	1	1	3	**1.8**	2	2	3	3	1	**2.2**	2	1	1	1	2	**1.4**	
0	**0.0**	0	1	0	1	0	1	**0.5**	0	2	0	1	0	**0.6**	1	2	3	0	0	**1.2**	
0	**0.0**	0	0	0	0	1	0	**0.2**	0	1	0	0	0	**0.2**	0	1	1	0	1	**0.6**	
0	**0.1**	0	1	1	1	0	0	**0.5**	0	0	0	0	1	**0.2**	1	2	2	1	1	**1.4**	
0	**0.1**	0	0	0	0	0	0	**0.0**	0	0	0	1	2	**0.6**	1	0	1	1	0	**0.6**	
0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	

PARTICIPANT	POMS Before Video	1	2	3	4	5	6	7	8		9	10	11	12	13	14		15	16	17	18
		DEPRESSION								MEAN	VIGOR						MEAN	ANGER			
		Unhappy	Sad	Blue	Hopeless	Discouraged	Miserable	helpless	worthless		Lively	Active	Energetic	Cheerful	Full of pep	Vigorous		Angry	Peeved	Annoyed	Grouchi
1	Disco Video	0	0	0	0	0	0	0	0	**0.0**	2	1	0	1	0	0	**0.7**	0	0	0	[illegible]
2	Disco Video	0	0	0	0	1	0	0	0	**0.1**	2	2	2	2	2	1	**1.8**	0	0	0	[illegible]
3	Disco Video	0	0	0	0	0	0	0	0	**0.0**	3	1	1	3	1	3	**2.0**	0	0	0	[illegible]
4	Disco Video	0	0	0	0	0	0	0	0	**0.0**	3	1	2	2	1	0	**1.5**	0	0	0	[illegible]
5	Disco Video	0	0	1	0	2	2	1	2	**1.0**	2	2	2	2	1	2	**1.8**	0	0	1	[illegible]
6	Disco Video	0	0	0	2	0	0	2	2	**0.8**	0	2	3	0	0	0	**0.8**	0	0	0	[illegible]
7	Disco Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	2	0	0	**0.3**	0	0	0	[illegible]
8	Disco Video	0	0	0	0	0	0	0	0	**0.0**	1	1	0	0	0	0	**0.3**	0	1	2	[illegible]
9	Disco Video	0	0	1	0	0	0	0	0	**0.1**	1	1	1	1	0	0	**0.7**	0	0	0	[illegible]
10	Disco Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	[illegible]
11	Disco Video	0	0	0	0	0	0	0	0	**0.0**	3	3	2	2	2	2	**2.3**	0	0	0	[illegible]
12	Disco Video	0	0	0	0	0	0	0	0	**0.0**	2	0	0	1	0	0	**0.5**	0	0	0	[illegible]
13	Disco Video	0	0	0	0	0	0	0	0	**0.0**	2	0	1	1	0	0	**0.7**	0	0	0	[illegible]
14	Disco Video	0	0	0	0	0	0	0	0	**0.0**	1	1	0	1	1	1	**0.8**	0	0	0	[illegible]
15	Disco Video	4	2	3	2	2	3	3	2	**2.6**	4	2	3	4	3	2	**3.0**	3	4	4	[illegible]
16	Disco Video	0	0	0	0	0	0	0	0	**0.0**	0	1	1	2	1	0	**0.8**	0	0	0	[illegible]
17	Disco Video	2	0	0	0	0	0	0	0	**0.3**	0	2	0	4	1	1	**1.3**	0	0	0	[illegible]
18	Disco Video	0	0	0	0	0	0	0	0	**0.0**	1	0	0	1	0	0	**0.3**	0	0	0	[illegible]
19	Disco Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	2	0	0	**0.3**	0	0	0	[illegible]
20	Disco Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	2	0	0	**0.3**	0	0	0	[illegible]
21	Disco Video	2	1	0	2	2	0	4	4	**1.9**	0	1	0	1	0	2	**0.7**	1	1	2	[illegible]
22	Disco Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	1	0	0	**0.7**	0	0	0	[illegible]
23	Disco Video	0	0	0	0	0	0	0	0	**0.0**	3	2	2	2	0	0	**1.5**	0	0	0	[illegible]
24	Disco Video	3	2	2	1	2	2	1	1	**1.8**	1	1	1	1	1	1	**1.0**	1	3	3	[illegible]

Total Mood Disturbance (TMD) = (Anger +Confusion+Dipression+Fatigue + Tension + (24 - Vigor)

McNair, D. M., Lorr, M. & Droppleman, L. F. (1971) *EdITS Manual for the Profile of Mood States*, San Diego, CA, Educational and Industrial Testing Service.

PARTICIPANT	POMS After Video	1	2	3	4	5	6	7	8		9	10	11	12	13	14		15	16	17	18
		DEPRESSION								MEAN	VIGOR						MEAN	ANGER			
		Unhappy	Sad	Blue	Hopeless	Discouraged	Miserable	helpless	worthless		Lively	Active	Energetic	Cheerful	Full of pep	Vigorous		Angry	Peeved	Annoyed	Grouchi
1	Disco Video	0	0	0	0	0	0	2	0	**0.3**	3	3	1	1	0	0	**1.3**	0	0	0	[illegible]
2	Disco Video	0	0	1	0	0	0	0	1	**0.3**	2	2	1	1	0	0	**1.0**	0	0	1	[illegible]
3	Disco Video	0	0	0	0	0	0	0	0	**0.0**	4	3	4	4	4	0	**3.2**	0	0	0	[illegible]
4	Disco Video	0	0	0	0	0	0	0	0	**0.0**	3	1	1	1	1	0	**1.2**	0	0	0	[illegible]
5	Disco Video	0	0	0	0	0	0	0	0	**0.0**	3	3	3	3	0	2	**2.3**	0	0	0	[illegible]
6	Disco Video	0	0	0	1	0	0	0	0	**0.1**	2	3	2	3	1	0	**1.8**	0	0	0	[illegible]
7	Disco Video	0	0	0	0	0	0	0	0	**0.0**	1	0	1	2	2	1	**1.2**	0	0	0	[illegible]
8	Disco Video	0	0	0	0	0	0	0	0	**0.0**	2	2	2	2	0	0	**1.3**	0	0	0	[illegible]
9	Disco Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	1	2	3	[illegible]
10	Disco Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	[illegible]
11	Disco Video	0	0	0	0	0	0	0	0	**0.0**	2	2	2	1	2	0	**1.5**	0	0	0	[illegible]
12	Disco Video	0	0	0	0	0	0	0	0	**0.0**	2	1	1	1	1	0	**1.0**	0	0	0	[illegible]
13	Disco Video	0	0	0	0	0	0	0	0	**0.0**	2	1	1	1	1	1	**1.2**	0	1	1	[illegible]
14	Disco Video	0	0	0	0	0	0	0	0	**0.0**	2	3	2	2	2	2	**2.2**	0	0	0	[illegible]
15	Disco Video	1	1	2	2	1	2	0	1	**1.3**	0	2	2	3	3	0	**1.7**	2	0	0	[illegible]
16	Disco Video	0	0	0	0	0	0	0	0	**0.0**	3	2	4	3	2	2	**2.7**	0	0	0	[illegible]
17	Disco Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	3	2	0	**1.3**	0	0	0	[illegible]
18	Disco Video	1	0	0	0	4	0	0	0	**0.6**	0	0	0	0	0	0	**0.0**	2	1	1	[illegible]
19	Disco Video	0	0	0	0	0	0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	[illegible]
20	Disco Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	1	0	1	**0.8**	0	1	0	[illegible]
21	Disco Video	0	0	3	0	0	0	1	0	**0.5**	3	2	2	2	2	3	**2.3**	0	0	0	[illegible]
22	Disco Video	0	0	0	1	0	0	0	0	**0.1**	1	1	1	1	1	0	**0.8**	0	0	0	[illegible]
23	Disco Video	0	0	0	0	0	0	0	0	**0.0**	3	2	2	3	2	0	**2.0**	0	0	0	[illegible]
24	Disco Video	1	1	1	1	1	1	1	1	**1.0**	2	1	1	1	1	1	**1.2**	1	2	1	[illegible]

19	20	21		22	23	24	25	26	27		28	29	30	31	32		33	34	35	36	37
			MEAN	TENSION						MEAN	CONFUSION					MEAN	FATIGUE				
Resentful	Bitter	Furious		Tense	On edge	Uneasy	Restless	Nervous	Anxious		Confused	Unable to concentrate	Bewildered	Forgetful	Uncertain		Worn out	Fatigued	Exhausted	Weary	Bushed
0	0	0	**0.0**	1	0	0	0	0	0	**0.2**	0	0	0	0	0	**0.0**	0	0	0	0	0
0	0	1	**0.1**	1	0	0	2	0	0	**0.5**	0	2	1	1	0	**0.8**	1	1	1	1	0
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	1	0	0	0	1	**0.4**	0	1	0	0	0
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	1	0	**0.2**	1	0	1	0	0
2	2	2	**1.1**	1	1	1	2	3	3	**1.8**	3	2	2	2	3	**2.4**	0	0	3	3	2
0	0	2	**0.3**	2	0	3	0	0	0	**0.8**	2	0	0	0	2	**0.8**	0	0	2	0	2
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0
0	1	0	**0.7**	0	0	0	1	0	0	**0.2**	2	1	1	0	0	**0.8**	0	3	4	3	2
0	0	0	**0.0**	0	1	1	0	0	0	**0.3**	0	1	0	0	0	**0.2**	3	2	3	1	0
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	1	2	1	0	1
0	0	1	**0.1**	0	1	1	1	1	1	**0.8**	1	1	1	0	0	**0.6**	1	1	2	1	1
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	2	0	0	0	0	**0.4**	0	0	0	0	0
0	0	0	**0.0**	0	0	0	3	0	0	**0.5**	2	1	0	0	2	**1.0**	0	0	0	0	0
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	1	0	**0.2**	1	1	1	1	1
2	2	3	**3.0**	1	3	2	2	3	2	**2.2**	3	3	2	2	2	**2.4**	3	2	3	2	3
0	0	0	**0.0**	0	0	0	1	0	0	**0.2**	2	0	1	2	1	**1.2**	1	0	0	0	0
0	0	0	**0.0**	1	1	1	1	1	1	**1.0**	0	2	0	2	0	**0.8**	3	3	3	2	3
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	1	0	0	0	**0.2**	4	3	3	0	3
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	1	2	1	0	1
0	0	0	**0.0**	0	2	0	2	2	2	**1.3**	0	0	0	3	2	**1.0**	3	2	2	2	0
1	4	1	**1.6**	2	0	1	1	2	2	**1.3**	3	4	1	4	3	**3.0**	3	3	3	2	2
0	0	0	**0.0**	0	0	0	1	0	0	**0.2**	0	1	0	0	0	**0.2**	1	1	0	0	0
0	0	0	**0.0**	0	0	0	1	0	0	**0.2**	0	3	0	2	1	**1.2**	1	0	0	0	0
2	1	1	**2.0**	2	1	2	2	2	2	**1.8**	2	3	2	2	2	**2.2**	3	2	2	2	3

19	20	21		22	23	24	25	26	27		28	29	30	31	32		33	34	35	36	37
			MEAN	TENSION						MEAN	CONFUSION					MEAN	FATIGUE				
Resentful	Bitter	Furious		Tense	On edge	Uneasy	Restless	Nervous	Anxious		Confused		Bewildered	Forgetful	Uncertain		Worn out	Fatigued	Exhausted	Weary	Bushed
0	0	0	**0.0**	2	0	1	0	1	0	**0.7**	1	0	0	0	0	**0.2**	0	0	0	0	1
0	1	0	**0.4**	0	0	1	0	0	0	**0.2**	2	0	0	1	0	**0.6**	0	0	0	0	0
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	1	0	0	0	0	**0.2**	0	0	0	0	0
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	1	1	0	0	0	**0.4**	1	0	1	0	0
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	1	1	0	**0.4**	0	0	0	1	0
0	0	0	**0.0**	0	0	1	0	0	0	**0.2**	1	0	0	1	0	**0.4**	0	0	3	0	0
0	0	0	**0.0**	0	0	0	2	0	0	**0.3**	0	0	0	0	0	**0.0**	0	0	0	0	0
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	2	0	0
0	0	0	**1.1**	0	1	1	0	0	0	**0.3**	2	1	0	0	0	**0.6**	3	3	3	1	2
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	1	0	0	0	0	**0.2**	1	1	1	0	1
0	0	1	**0.1**	0	0	0	1	0	0	**0.2**	0	0	1	1	0	**0.4**	1	1	2	1	1
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0
0	0	0	**0.3**	0	1	0	3	0	0	**0.7**	3	2	1	0	0	**1.2**	0	0	0	0	0
0	0	0	**0.0**	0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	1	0	0	0
0	1	2	**1.0**	4	2	0	3	1	0	**1.7**	4	3	2	1	0	**2.0**	2	0	0	1	0
0	0	0	**0.0**	0	0	0	3	0	0	**0.5**	3	0	3	0	0	**1.2**	0	0	0	0	0
0	0	0	**0.0**	0	0	0	1	0	0	**0.2**	0	1	0	0	0	**0.2**	0	3	0	0	2
0	1	0	**0.7**	2	0	3	0	1	0	**1.0**	3	1	0	0	0	**0.8**	4	4	3	0	3
0	0	0	**0.0**	1	0	0	0	0	0	**0.2**	1	0	1	0	0	**0.4**	1	2	1	0	1
0	0	0	**0.3**	1	0	0	1	1	1	**0.7**	0	1	1	3	0	**1.0**	1	1	1	1	0
0	3	0	**0.4**	1	0	0	3	1	0	**0.8**	1	1	1	2	1	**1.2**	0	1	1	1	2
0	0	0	**0.0**	0	0	0	2	0	0	**0.3**	4	0	0	0	3	**1.4**	1	0	0	0	0
0	0	0	**0.0**	0	0	2	0	0	0	**0.3**	0	2	0	0	0	**0.4**	0	0	0	0	0
1	1	1	**1.1**	1	1	2	1	1	2	**1.3**	4	3	2	1	3	**2.6**	2	1	1	1	1

PARTICIPANT	POMS **Before** Video	1	2	3	4	5	6	7	8		9	10	11	12	13	14		15	16	17	18	19	20	21	
		DEPRESSION								MEAN	VIGOR						MEAN	ANGER							MEAN
		Unhappy	Sad	Blue	Hopeless	Discouraged	Miserable	helpless	worthless		Lively	Active	Energetic	Cheerful	Full of pep	Vigorous		Angry	Peeved	Annoyed	Grouchi	Resentful	Bitter	Furious	
1	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	3	1	1	0	0	**1.2**	0	0	0	0	0	0	0	**0.0**
2	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	3	2	2	2	0	0	**1.5**	0	1	0	0	0	0	0	**0.1**
3	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	2	2	4	0	0	**1.5**	0	0	0	0	0	0	0	**0.0**
4	Hobbit Video	0	1	1	0	0	0	0	0	**0.3**	2	2	1	1	0	1	**1.2**	0	0	1	1	0	0	0	**0.3**
5	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	0	2	2	0	0	**0.8**	0	0	0	1	0	0	0	**0.1**
6	Hobbit Video	1	1	1	0	1	0	0	0	**0.5**	1	1	1	1	0	0	**0.7**	1	1	1	0	1	0	0	**0.6**
7	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	1	2	2	1	1	**1.3**	0	1	0	0	0	1	0	**0.3**
8	Hobbit Video	0	1	0	1	0	0	0	0	**0.3**	1	0	1	1	0	0	**0.5**	0	1	0	0	0	0	0	**0.1**
9	Hobbit Video	1	0	0	0	0	0	0	0	**0.1**	1	1	2	1	0	0	**0.8**	0	0	0	0	0	0	0	**0.0**
10	Hobbit Video	0	0	0	1	0	3	0	0	**0.5**	3	3	3	3	1	1	**2.3**	0	0	0	0	0	0	0	**0.0**
11	Hobbit Video	1	1	0	0	0	0	0	0	**0.3**	1	0	1	0	0	0	**0.3**	1	0	1	0	0	0	0	**0.3**
12	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	1	1	0	**0.8**	0	1	0	0	0	0	0	**0.1**
13	Hobbit Video	0	0	0	0	1	0	0	0	**0.1**	0	0	0	1	0	0	**0.2**	0	0	0	1	0	0	0	**0.1**
14	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	3	1	1	2	1	0	**1.3**	0	0	0	0	0	0	0	**0.0**
15	Hobbit Video	0	0	0	0	1	0	1	0	**0.3**	2	1	2	0	1	1	**1.2**	0	1	0	0	0	1	0	**0.3**
16	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	1	1	0	0	0	**0.7**	0	0	0	0	0	0	0	**0.0**
17	Hobbit Video	1	1	0	0	1	2	0	0	**0.6**	1	0	0	0	0	0	**0.2**	0	0	0	1	1	0	0	**0.3**
18	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	2	1	0	**1.0**	0	0	0	0	0	0	0	**0.0**
19	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	2	2	3	2	2	**2.2**	0	0	0	0	0	0	0	**0.0**
20	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	2	2	1	0	0	**1.2**	0	0	0	0	0	0	0	**0.0**
21	Hobbit Video	0	1	0	1	0	0	1	0	**0.4**	3	2	3	3	2	2	**2.5**	0	0	1	1	0	0	0	**0.3**
22	Hobbit Video	0	0	1	1	2	1	0	0	**0.6**	2	2	2	2	1	1	**1.7**	0	0	0	0	0	1	0	**0.1**
23	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	1	1	2	1	0	**1.2**	0	0	0	0	0	0	0	**0.0**
24	Hobbit Video	0	0	1	1	1	0	1	1	**0.6**	3	3	3	3	2	3	**2.8**	0	0	0	0	0	1	0	**0.1**
25	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	2	3	1	2	1	**1.7**	0	0	0	0	0	0	0	**0.0**
26	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	1	1	1	**1.0**	0	0	0	0	0	0	0	**0.0**

Total Mood Disturbance (TMD) = (Anger +Confusion+Dipression+Fatigue + Tension + (24 - Vigor)

McNair, D. M., Lorr, M. & Droppleman, L. F. (1971) *EdITS Manual for the Profile of Mood States*, San Diego, CA, Educational and Industrial Testing Service.

PARTICIPANT	POMS **After** Video	1	2	3	4	5	6	7	8		9	10	11	12	13	14		15	16	17	18	19	20	21	
		DEPRESSION								MEAN	VIGOR						MEAN	ANGER							MEAN
		Unhappy	Sad	Blue	Hopeless	Discouraged	Miserable	helpless	worthless		Lively	Active	Energetic	Cheerful	Full of pep	Vigorous		Angry	Peeved	Annoyed	Grouchi	Resentful	Bitter	Furious	
1	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	4	3	3	3	4	0	**2.8**	0	0	0	0	0	0	0	**0.0**
2	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	3	2	3	3	0	0	**1.8**	0	0	0	0	0	0	0	**0.0**
3	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	4	4	4	4	0	0	**2.7**	0	0	0	0	0	0	0	**0.0**
4	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	1	2	3	2	0	**1.7**	0	0	0	0	0	0	0	**0.0**
5	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	2	1	0	**1.0**	0	0	0	0	0	0	0	**0.0**
6	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	1	1	3	2	1	**1.7**	0	0	0	0	0	0	0	**0.0**
7	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	3	2	3	3	0	0	**1.8**	0	0	0	0	0	0	0	**0.0**
8	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	0	1	2	1	0	**1.0**	0	0	0	0	0	0	0	**0.0**
9	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	2	2	2	1	0	**1.5**	0	0	0	0	0	0	0	**0.0**
10	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	3	1	1	4	4	3	**2.7**	0	0	0	0	0	0	0	**0.0**
11	Hobbit Video	0	0	0	0	0	2	0	0	**0.3**	3	0	0	0	1	0	**0.7**	0	0	0	0	0	0	0	**0.0**
12	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	1	1	0	**0.8**	0	0	0	0	0	0	0	**0.0**
13	Hobbit Video	0	0	0	0	0	1	0	0	**0.1**	0	0	0	0	0	0	**0.0**	1	1	1	2	0	1	0	**0.9**
14	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	1	1	2	1	0	**1.2**	0	0	0	0	0	0	0	**0.0**
15	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	2	3	2	1	0	**1.7**	0	0	0	0	0	0	0	**0.0**
16	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	1	0	0	**0.7**	0	0	0	0	0	0	0	**0.0**
17	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	3	1	1	0	2	1	**1.3**	0	0	0	0	0	0	0	**0.0**
18	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	1	1	2	1	0	**1.2**	0	0	0	0	0	0	0	**0.0**
19	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	3	3	3	3	3	3	**3.0**	0	0	0	0	0	0	0	**0.0**
20	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	1	1	1	1	1	0	**0.8**	0	0	0	0	0	0	0	**0.0**
21	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	0	2	2	2	1	2	**1.5**	0	0	0	0	0	0	0	**0.0**
22	Hobbit Video	0	0	1	0	0	0	0	0	**0.1**	3	3	3	3	2	0	**2.3**	0	1	0	0	0	0	0	**0.1**
23	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	3	2	3	3	2	0	**2.2**	0	0	0	0	0	0	0	**0.0**
24	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	3	3	3	3	2	2	**2.7**	0	0	0	0	0	0	0	**0.0**
25	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	1	1	2	1	1	**1.3**	0	1	0	0	0	0	0	**0.1**
26	Hobbit Video	0	0	0	0	0	0	0	0	**0.0**	2	2	2	3	0	0	**1.5**	0	0	0	0	0	0	0	**0.0**

22	23	24	25	26	27		28	29	30	31	32		33	34	35	36	37		
TENSION						MEAN	CONFUSION					MEAN	FATIGUE					MEAN	TM
Tense	On edge	Uneasy	Restless	Nervous	Anxious		Confused	Unable to concentrate	Bewildered	Forgetful	Uncertain		Worn out	Fatigued	Exhausted	Weary	Bushed		Bef
0	0	2	2	0	1	**0.8**	0	1	0	0	0	**0.2**	2	1	1	0	0	**0.8**	
3	1	0	0	0	0	**0.7**	2	0	0	0	1	**0.6**	0	0	1	0	0	**0.2**	
0	1	0	3	0	0	**0.7**	0	2	0	1	0	**0.6**	1	0	1	0	0	**0.4**	
0	1	0	2	0	0	**0.5**	0	1	1	1	0	**0.6**	1	1	1	1	0	**0.8**	
0	0	0	1	0	0	**0.2**	0	0	0	1	0	**0.2**	1	0	0	0	0	**0.2**	
2	2	1	0	1	2	**1.3**	1	1	1	1	1	**1.0**	1	1	2	1	1	**1.2**	
0	0	0	1	0	1	**0.3**	2	0	1	0	0	**0.6**	0	1	0	0	0	**0.2**	
1	0	1	1	1	0	**0.7**	2	1	0	0	1	**0.8**	1	1	0	2	0	**0.8**	
0	0	1	2	0	1	**0.7**	1	2	0	0	1	**0.8**	0	0	2	0	0	**0.4**	
0	1	1	2	0	0	**0.7**	0	0	0	0	1	**0.2**	0	1	0	0	0	**0.2**	
1	0	0	0	0	0	**0.2**	0	1	0	0	0	**0.2**	1	3	2	0	3	**1.8**	
1	0	0	1	1	1	**0.7**	1	0	1	0	1	**0.6**	1	1	1	1	1	**1.0**	
0	0	0	0	0	0	**0.0**	0	0	0	1	0	**0.2**	2	2	1	0	2	**1.4**	
1	0	0	0	0	2	**0.5**	0	1	0	1	1	**0.6**	0	0	0	0	0	**0.0**	
0	1	1	1	0	0	**0.5**	1	1	0	0	0	**0.4**	1	2	1	1	0	**1.0**	
0	0	0	1	0	0	**0.2**	0	1	0	0	0	**0.2**	1	0	1	1	0	**0.6**	
1	0	0	1	1	1	**0.7**	1	1	0	1	2	**1.0**	1	1	1	1	0	**0.8**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	1	2	0	0	0	**0.6**	
1	0	0	0	0	0	**0.2**	0	0	0	0	0	**0**	1	1	1	0	0	**0.6**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	1	0	1	1	0	**0.6**	
1	0	0	1	0	1	**0.5**	1	1	0	1	1	**0.8**	2	2	2	0	0	**1.2**	
2	1	1	1	1	0	**1.0**	3	1	0	0	1	**1.0**	3	2	2	0	1	**1.6**	
0	0	0	0	0	0	**0.0**	0	1	0	0	0	**0.2**	1	1	0	0	0	**0.4**	
0	1	1	2	2	2	**1.3**	2	2	2	3	2	**2.2**	1	3	2	2	2	**2.0**	
0	1	1	1	1	1	**0.8**	1	2	0	1	3	**1.4**	1	0	1	1	1	**0.8**	
1	0	0	1	0	0	**0.3**	0	0	1	1	0	**0.4**	2	2	2	0	1	**1.4**	
0	0	0	1	0	0	**0.2**	0	0	0	0	0	**0.0**	1	0	0	0	0	**0.2**	

22	23	24	25	26	27		28	29	30	31	32		33	34	35	36	37		
TENSION						MEAN	CONFUSION					MEAN	FATIGUE					MEAN	TM
Tense	On edge	Uneasy	Restless	Nervous	Anxious		Confused	Unable to concentrate	Bewildered	Forgetful	Uncertain		Worn out	Fatigued	Exhausted	Weary	Bushed		Aft
0	0	0	0	0	0	**0.0**	2	0	0	0	0	**0.4**	0	0	0	0	0	**0.0**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	1	0	0	**0.2**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
0	0	0	0	0	0	**0.0**	1	0	0	1	0	**0.4**	0	0	0	0	0	**0.0**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
0	2	0	0	0	0	**0.3**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
0	0	0	0	1	0	**0.2**	3	0	0	0	1	**0.8**	0	1	0	0	1	**0.4**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
0	0	0	0	0	0	**0.0**	0	0	1	0	0	**0.2**	0	0	0	0	0	**0.0**	
1	1	0	0	0	1	**0.5**	2	1	1	1	1	**1.2**	2	2	2	1	2	**1.8**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	1	0	0	0	**0.2**	
0	1	1	1	0	1	**0.7**	1	1	1	1	1	**1.0**	1	1	1	1	1	**1.0**	
0	0	0	1	0	0	**0.2**	0	1	0	0	0	**0.2**	0	1	1	1	0	**0.6**	
0	1	0	0	0	0	**0.2**	0	0	0	0	0	**0.0**	1	0	0	0	1	**0.4**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	1	0	0	0	**0.2**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0**	0	0	0	0	0	**0.0**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	
0	0	0	1	1	0	**0.3**	0	1	0	2	1	**0.8**	2	2	2	0	0	**1.2**	
2	0	0	2	0	0	**0.7**	1	1	0	0	0	**0.4**	1	0	1	0	0	**0.4**	
0	0	0	0	0	0	**0.0**	0	0	1	0	0	**0.2**	0	0	0	0	0	**0.0**	
0	1	0	2	1	0	**0.7**	0	2	2	1	1	**1.2**	0	1	1	1	2	**1.0**	
0	0	0	1	0	0	**0.2**	3	1	2	2	2	**2.0**	1	1	1	1	1	**1.0**	
0	0	0	0	0	0	**0.0**	0	0	0	0	0	**0.0**	0	0	1	0	0	**0.2**	
0	0	0	0	0	0	**0.0**	1	0	0	0	0	**0.2**	0	0	0	0	0	**0.0**	

Appendix C: Experiment 3

Appendix C contains the material and stimuli that were developed in order to allow the conduct of Experiment 3.

Universi [redacted]

Human Research Ethics Milestone Report Form 4

(for progress and final reports)

4.1 Project title

The effect of mood on performance in a non-normal situation

4.2 Principal investigator

Morteza Tehrani

4.3 USQ HREC Reference Number

Student No. 1091419

4.4 Project duration (subject to annual review)

Commenced	2016	Expiry	

4.5 The current status of the project is:

☐ Project not yet commenced

☐ Project commenced, but abandoned*

☐ Project proceeding as approved

☐ Project proceeding in accordance with modifications submitted and approved

☐ Project has varied from that approved*

☒ Project has been completed → This is a FINAL report

* Please provide details:

The aim of this research was to investigate how a performance manipulation scheme affects information recall attained from pre-flight safety briefings presented at the onset of each commercial flight. It was hypothesised that a rewarding statement prior to the pre-flight safety demonstration can motivate passengers to pay more attention to the safety brief, and hence, improve their recall of information conveyed in the safety briefing. A parametric analysis was employed for this study.

4.6 Provide a summary of the research project progress over the past 12 months (or since the last progress report date)

My final Draft was initially planned to be submitted in January 2018. However, due to the personal difficulties (family matters) I had to take Leave of Absence from 29/12/2017- 6/8/2018. Hence, the final draft submission has been delayed to the latter.

4.7 Participants and consent

	Yes	No	N/A
Have participants been recruited during the reporting period?	☒	☐	☐
If yes, how many	53		
Have the approved consent procedures been followed?	☒	☐	☐
If NO, have breaches previously been reported	☐	☐	

4.8 Research conduct

	Yes	No	N/A
Has the project been conducted in accordance with the approved proposal or protocol?	☒	☐	
Have you received any complaints or concerns about the ethical conduct of your project?	☐	☒	

Have you become aware of any adverse events (AEs) (human), serious adverse events (SAEs), serious adverse drug reaction (SADR), serious unexpected suspected adverse reaction (SUSAR), serious adverse device event (SADE) or any other harms to research participants that were not anticipated in the approved protocol?	☐	☒	
If YES, has this event/s previously been reported to the University of Southern Queensland Human Research Ethics Committee?	☐	☐	☒
Have you collected, used and stored the data for this project in accordance with the confidentiality and data security procedures and conditions of approval?	☒	☐	
Has the research achieved the anticipated results to date?	☒	☐	☐
Are there any other issues about the conduct of this project that you would like to bring to the attention of the University of Southern Queensland Human Research Ethics Committee?	☐	☒	
If YES, outline any other issues in this section:			

4.9 Outline a brief summary of the results achieved to date. Include any publications or other outputs that have arisen (or are anticipated to arise) from this research project.

The data analyses have been completed and I have been engaged in completing the final chapter and submit for proofreading by 15 July 2018.

Principal Investigator Declaration

I the undersigned declare that I:

- accept responsibility for the ethical conduct of this research project in accordance with the principles outlined in the University's Research Code of Conduct Policy (2007), the Australian Code for the Responsible Conduct of Research (2007), and the National Statement on Ethical Conduct in Human Research;
- undertake to conduct this research project in accordance with the protocols and procedures outlined in the proposal as approved by the University of Southern Queensland Human Research Ethics Committee (USQ HREC);
- inform the USQ HREC of any changes to the protocol after the approval of the Committee has been obtained using the USQ HREC Amendment Application form;

- have read and agree to comply with the University of Southern Queensland Research Data Management Policy and pursuant policies and procedures and have a plan for managing and/or sharing Research Data securely; and
- understand and agree that study files and documents and research records and data may be subject to inspection by the University of Southern Queensland, USQ HREC, research integrity officer, the sponsor or an independent body for audit and monitoring purposes.

Name (please print)	**Signature**	**Date**
Morteza Tehrani	 X Morteza Tehrani Mr	14 May 2018

Does this research project involve? (tick all that apply)

University of Southern Queensland

Human Research Ethics Application Form 1 – Part A (All Applicants)

- ☒ Recruitment or observation of human participants → **Also Complete Form 1 – Part B**
- ☐ Existing (or archival) data → **Also Complete Form 1 – Part C**
- ☐ Existing biospecimens → **Also Complete Form 1 – Part D**
- ☐ Any form of genetic testing or analysis of genetic material → Contact the Ethics Officer
- ☐ Clinical trial → Contact the Ethics Officer

Project overview

1A.1 Does this project include any of the following participant groups?

	Yes	No
Women who are pregnant and/or the human foetus	☐	☒
Children or young people under the age of 18 years *(Note: Ensure you have assessed and confirmed that all investigators on this project who will be involved with children and/or young people have obtained a Working with Children Check (Blue Card), Blue Card Positive Exemption notice, or are exempt on the basis of their professional duties.)*	☐	☒
People with an intellectual disability or mental impairment of any kind *(this includes intellectual or mental impairment, mental disorder, brain injury, dementia, etc.)*	☐	☒
People considered to be a forensic patient or an involuntary patient	☐	☒
People with impaired capacity for communication	☐	☒
Prisoners or people on parole	☐*	☒
Children who are the subject of a child protection order	☐	☒
People highly dependent on medical care, including a person who is unconscious	☐*	☒
Military personnel	☐*	☒
Military veterans	☐*	☒
People who would not usually be considered vulnerable but would be considered vulnerable in the context of this project	☐	☒
Aboriginal and/or Torres Strait Islander peoples	☐*	☒

Aboriginal and/or Torres Strait Islander peoples' health research	☐*	☒
Hospital patients	☐*	☒
People in other countries	☐	☒
People who would consider English to be their second language	☒	☐

* Please contact the Ethics Team for further advice before proceeding with this application

1A.2 Does the project include any of the following procedures?

	Yes	**No**
Any physical, psychological, social, economic, and/or legal risks greater than inconvenience or discomfort, in either the short or long term, resulting from participation in, or use of data in, this project	☐	☒
Innovative interventions or therapies *(e.g. administration of drugs, clinical or psychological treatments, etc.)*	☐	☒
Human genetics	☐	☒
Research intended to study/expose illegal activity	☐	☒
Radioactive substances or ionising radiation *(e.g. DXA, X-ray)*	☐	☒
Sensitive and/or contentions issues *(e.g. suicide, eating disorders, body image, trauma, violence, abortion, etc.)*	☐	☒
Toxins, mutagens, teratogens or carcinogens	☐	☒
Deception of participants, concealment, or covert observation	☐	☒
Seeking disclosure of information which may be prejudicial to participants	☐	☒

1A.3 Does the project include any of the following operational requirements?

	Yes	**No**
Recruitment of USQ students (as participants) *(See table 1A.3a and provide evidence of permission to recruit)*	☒	☐
Recruitment of USQ employees (as participants) *(See table 1A.3a and provide evidence of permission to recruit)*	☐	☒
International travel	☐	☒
Collecting data off-campus or in rural settings	☐	☒
The collection, use or disclosure of IDENTIFIABLE personal information *(e.g. names and contact details on consent forms)*	☐#	☒

The collection, use or disclosure of CODED personal information *(e.g. when identifying details are replaced by codes, pseudonyms, etc.)*	☐#	☒
The collection of information by observing participants without their knowledge	☐#	☒
# Will this information be collected or used **without** the consent or knowledge of the individual whose information is being used?	☐ ^	☒
# Will this data include health information	☐ ^	☒

^ Waiver of consent justification form to be completed. Please contact the Ethics Office ethics@usq.edu.au

1A.3a Approval to recruit USQ staff and students must be obtained from the appropriate delegate of the University.

Scope of recruitment	Appropriate Delegate
Students with a course/courses within one discipline	Head of School
Students within one Faculty area	Executive Dean
Students across the University and/or across University campuses	Deputy Vice-Chancellor (Students & Communities)
Staff (any)	Senior Deputy Vice-Chancellor

Project details

1A.4 Project title

The Effect of Mood/Rewards on Performance in Non-normal Situations

1A.5 Investigator Details

The first investigator listed must be the Principal Investigator, who is responsible for the overall conduct of this research.

Role	Staff/Student ID	Full Name *(inc title)*	Contact Details *(inc email and mobile phone)*	Describe your experience relevant to the proposed research
Principal Investigator	U1091419	Mr Morteza Tehrani	mtehrani@ozemail.com.au 0424045306	SME in Aviation Safety and Human Factors
Supervisor (for Student)		Professor Paul Bates	Paul.Bates@usq.edu.au 617 3470 4549	Professor (Aviation and Logistics)
Co-investigator		Professor Patrick Murray	Patrick.Murray@usq.edu.au 617 3470 4556	Professor (Aviation and Logistics)
Co-investigator		Dr Wayne Martin	Wayne.Martin@usq.edu.au 617 3470 4558	Lecturer (Aviation and Logistics)
Choose an item.				
Choose an item.				
Choose an item.				
Choose an item.				

1A.6 In plain language, provide a succinct description of the background and the potential significance of the research project (approx. 400 words).

Air travel is an increasingly viable mode of transport. This progress influences aircraft manufacturers to consider larger designs that carry greater numbers of passengers than ever before. The safety regulatory framework surrounding these operations is correspondingly complex. Aviation regulators are increasingly focusing on passenger survivability to enable a safe and expeditious evacuation of an aircraft during an emergency.

For airlines, the delivery of the preflight safety briefing prior to commercial flights is not only an opportunity to inform passengers about the safety features on-board the aircraft they are flying, but a chance to engage them with the safety matters. Positively influencing their mood may improve retention of critical information, and this study aims to find other means such as financial incentives to improve their recall performance for the unlikely event of emergency situations.

The effect of mood on performance under routine (i.e., daily) conditions is well documented. Pleasant/positive moods such as happiness or elation have been shown to improve: intellectual performance (i.e., verbal and quantitative ability; Albarracin & Hart, 2011), task interest (Hirt, Melton, McDonald & Harackiewicz, 1996), creativity (Montgomery, Hodges, & Kaufman, 2004), teamwork (Barsade, 2002), decision-making (Barsade & Gibson, 2007) and life meaningfulness (King, Hicks, Krull, & Del Gaiso, 2006). However, little is known about the effect of mood on performance in non-normal situations such as those experienced during an unscheduled event (i.e., rapid disembarkation from an aircraft). Therefore, a hazardous environment such as aviation would be an ideal setting and the aviation industry can benefit from the mood-performance congruence by utilising those concepts in the distressing events to protect passengers in critical situations. Critical situations are those circumstances when an unpredicted event such as a forced ditching, fire or smoke requires passengers to egress the aircraft cabin in the shortest possible time.

Manipulation of mood may be used as a tool to improve performance and safety. While this relationship is not new, Muir and colleagues, by using financial incentives, were able to manipulate the egress time in an emergency evacuation as financial rewards can be motivational for the decision-making process (Ding & Beaulieu, 2011). Such incentives may provide airlines with some insight into simple and potentially effective methods to positively influence passengers' behaviour for the rare events of an emergency.

1A.7 Clearly state the aims and/or hypotheses of the research project (approx. 200 words).

The aim of the present research is to investigate how a performance manipulation scheme affects information recall attained from pre-flight safety briefings presented at the onset of each commercial flight. It is hypothesised that a rewarding statement prior to the pre-flight safety demonstration can motivate passengers to pay more attention to the safety brief, and hence, improve their recall of information conveyed in the safety briefing. It is also anticipated that the group whose mood is positively manipulated would demonstrate enhanced mood (happier) than the control group who are traditionally exposed to a standard pre-flight safety brief. A parametric analysis will be employed for the present research.

1A.8 Outline the benefits to participants and/or to the community as a result of this research being conducted

The personal benefits for participants in the research are limited to the receipt of a $10 bookshop gift voucher. However, from the wider community's perspective, the expected benefit of the research is improved understanding of the relationship between mood, rewards and performance in non-normal situations.

It is anticipated that the findings derived from this research will not only impact the airline industry to reposition their approach when designing safety briefings prior to each flight, it connotes as a potential application for other industries where the rewarding systems may apply.

1A.9 Define the risks, in either the short and/or long term, of participation in this project
(e.g. physical, psychological, social, economic or legal risks greater than inconvenience or discomfort.)

This project does not have any physical interaction apart from viewing a pre-flight safety briefing and filling out appropriate forms such as demographic, consent, and questionnaires. Therefore, participants will not be exposed to any form of risk at any time.

1A.10 Are all of these risks outlined in the Participant Information Sheet or within the explanatory statement at the beginning of a data collection instrument, and (where relevant) on the consent form?

☒ Yes ☐ No

If No, please explain why not.

1A.11 Outline the arrangements planned to minimise the risks involved in these procedures.

N/A

1A.12 What will you do in cases where unexpected events or emergencies occur as a result of participation in this project?

For example, what facilities or services are available to deal with such incidents? *(e.g. an adverse drug reaction, revelation of child abuse, illegal activities, participant becomes distressed during or after data collection.)*

Is an appropriate list of referral services available with the Participant Information Sheet or explanatory statement?

N/A

1A.13 Outline the strategies that you have in place to reduce any risks to the researchers.

N/A

1A.14 Type of research - 1

☐ Staff

☒ Student

☐ Honours

☐ Masters

☒ PhD — Doctor of Philosophy

☐ Other

Degree program name:

☐ Course project — Course code & course name: Approved by Professor Paul R Bates

(For student research please provide confirmation of candidature or Head of School approval.)

1A.15 Type of research -2

☐ Action research
☐ Case study
☐ Clinical research
☐ Clinical trial / use of drug or therapeutic device
☐ Epidemiological
☐ Medical research
☐ Mental health
☐ Oral history / biographical
☒ Public health and safety
☒ Qualitative
☒ Quantitative
☒ Social science
☐ Other

If you chose ‘Other’, how would you describe it?

1A.16 Do any of the investigators have a personal or financial interest in the outcomes of this research, or in any of the organisations involved with, or funding this project?

☐ Yes ☒ No

If Yes, please explain what their role at the organisation(s) is and what measures have been implemented to reduce the possibility of coercion for participants.

1A.17 Has funding been obtained for this project?

☐ Yes ☒ No

If Yes, provide the name of the funding body or agency and the relevant project number.

Data access and security

1A.18 Describe the security arrangements for the storage of the data. Include details of where the data will be stored and who will have access to this information.

You should consult the University's Research Data Management Plan to ensure that your data is managed securely and effectively.

The data will be stored securely by USQ using Cloudstor and can be accessed by Morteza Tehrani (primary researcher), Professor Paul Bates(supervisor), Professor Patrick Murray (co-supervisor) and Dr Wayne Martin (co-supervisor).

1A.19 Will a non-USQ third party have access to the data during this research?

☐ Yes ☒ No

If YES:

- please explain how the participants are informed about this and how you will ensure that their privacy is protected during the data transfer process to the third party.

1A.20 Will some or all of the research data be openly or publicly available at some time in the future?

Note: It is recommended that unless your data can not be shared for ethical, privacy or confidentiality matters, that you incorporate the future use of data in your research design and include a statement within the participant information sheet/explanatory statement to this effect.

☒ Yes ☐ No

If YES:

- please explain how and what will be shared.

The identity of the participants will be kept only for the purpose of clarifying the information provided if required. Therefore, participants' personal information such as their names, age, gender or race will not be shared with any organisation or third party except by law. However, the de-identified data extracted from participants will be available to the public to educate the air travellers as it correlates with public safety.

If NO:

- please explain why the data will not be shared.

1A.21 Are the data access and security arrangements detailed in the participant information sheet or explanatory statement?

☒ Yes ☐ No

If NO:

- please explain why not.

1A.22 How will the data be disposed of if it is no longer required?

Note: Whilst there is a minimum retention period for all research data (refer Queensland State Archives University Sector Retention and Disposal Schedule) USQ encourages researchers to responsibly shore research data for future research use where possible.

The hardcopy information will be shredded after transforming into the electronic format. The electronic copies will be kept within the school of commerce for 5 years.

Communication of research outcomes

1A.23 Please indicate the format/s in which the research will be published and/or communicated to participants or organisations:

☒ Thesis ☐ Dataset

☒ Journal article ☒ Report to participants

☐ Book / book chapter ☐ Report to organisation

☒ Conference ☐ Report to community or group

☐ Other

If Other checked, please provide details.

1A.24 Please describe how participants and/or other interested stakeholders will be able to access the results.

Participants and interested stakeholders may request to obtain a copy of the results directly from the researcher after research completion.

1A.25 In what format will the results be provided?

☒ In non-identifiable summary form *(i.e., no individual or organisation can be identified)*

☐ In re-identifiable summary form *(i.e., information has had identifiers removed but in a manner which may which may allow some individuals to be identified)*

☐ In identified form, or in a manner which may allow some participants to be identified

☐ Other

If Other checked, please describe the format in which you intend to provide others with the results.

1A.26 If participants will be subjected to any tests during this project, how will information about the results be communicated to participants and/or to their parents or guardians? What arrangements will be in place to deal with participant's distress in the case of adverse test results?

OR ☒This question is not applicable to this project.

Declarations

USQ Principal Investigator Declaration

I the undersigned declare that I:

- have gained the appropriate approvals through my School or Research Centre to conduct this research project;
- have completed the peer review of this ethics application, in accordance with the USQ Statement on Peer Review;
- accept ultimate responsibility for the ethical conduct of this research project in accordance with the principles outlined in the University's Research Code of Conduct Policy, the Australian Code for the Responsible Conduct of Research (2007), and the National Statement on Ethical Conduct in Human Research (2007);
- have ensured that all people involved in this research project understand and accept their roles and responsibilities;
- undertake to conduct this research project in accordance with the protocols and procedures outlined in the proposal as approved by the University of Southern Queensland Human Research Ethics Committee (USQ HREC);
- inform the USQ HREC of any changes to the protocol after the approval of the Committee has been obtained using the USQ HREC Amendment Application procedure AND inform all people involved in this research project of the amended protocol;

- have read and agree to comply with the University of Southern Queensland Research Data Management Policy and pursuant policies and procedures and have a plan for managing and/or sharing Research Data securely; and
- understand and agree that project files, documents, research records, and data may be subject to inspection by the University of Southern Queensland, USQ HREC, a research integrity officer, the sponsor or an independent body for auditing and monitoring purposes.

Name (please print)	Signature	Date
Morteza Tehrani	Tehrani	3 Feb 2017

UNIVERSITY OF SOUTHERN QUEENSLAND

Human Research Ethics Milestone Report Form 4

(for progress and final reports)

4.1 Project title

The effect of mood on performance in a non-normal situation

4.2 Principal investigator

Morteza Tehrani

4.3 USQ HREC Reference Number

Student No. 1091419

4.4 Project duration (subject to annual review)

Commenced	2016	Expiry	

4.5 The current status of the project is:

☐ Project not yet commenced

☐ Project commenced, but abandoned*

☐ Project proceeding as approved

☐ Project proceeding in accordance with modifications submitted and approved

☐ Project has varied from that approved*

☒ Project has been completed → This is a FINAL report

* Please provide details:

The aim of this research was to investigate how a performance manipulation scheme affects information recall attained from pre-flight safety briefings presented at the onset of each commercial flight. It was hypothesised that a rewarding statement prior to the pre-flight safety demonstration can motivate passengers to pay more attention to the safety brief, and hence, improve their recall of information conveyed in the safety briefing. A parametric analysis was employed for this study.

4.6 Provide a summary of the research project progress over the past 12 months (or since the last progress report date)

My final Draft was initially planned to be submitted in January 2018. However, due to the personal difficulties (family matters) I had to take Leave of Absence from 29/12/2017- 6/8/2018. Hence, the final draft submission has been delayed to the latter.

4.7 Participants and consent

	Yes	**No**	**N/A**
Have participants been recruited during the reporting period?	☒	☐	☐
If yes, how many	53		
Have the approved consent procedures been followed?	☒	☐	☐
If NO, have breaches previously been reported	☐	☐	

4.8 Research conduct

	Yes	**No**	**N/A**
Has the project been conducted in accordance with the approved proposal or protocol?	☒	☐	
Have you received any complaints or concerns about the ethical conduct of your project?	☐	☒	
Have you become aware of any adverse events (AEs) (human), serious adverse events (SAEs), serious adverse drug reaction (SADR), serious unexpected suspected adverse reaction (SUSAR), serious adverse device event (SADE) or any other harms to research participants that were not anticipated in the approved protocol?	☐	☒	
If YES, has this event/s previously been reported to the University of Southern Queensland Human Research Ethics Committee?	☐	☐	☒
Have you collected, used and stored the data for this project in accordance with the confidentiality and data security procedures and conditions of approval?	☒	☐	
Has the research achieved the anticipated results to date?	☒	☐	☐
Are there any other issues about the conduct of this project that you would like to bring to the attention of the University of Southern Queensland Human Research Ethics Committee?	☐	☒	
If YES, outline any other issues in this section:			

4.9 Outline a brief summary of the results achieved to date. Include any publications or other outputs that have arisen (or are anticipated to arise) from this research project.

The data analyses have been completed and I have been engaged in completing the final chapter and submit for proofreading by 15 July 2018.

Principal Investigator Declaration

I the undersigned declare that I:

- accept responsibility for the ethical conduct of this research project in accordance with the principles outlined in the University's Research Code of Conduct Policy (2007), the Australian Code for the Responsible Conduct of Research (2007), and the National Statement on Ethical Conduct in Human Research;
- undertake to conduct this research project in accordance with the protocols and procedures outlined in the proposal as approved by the University of Southern Queensland Human Research Ethics Committee (USQ HREC);
- inform the USQ HREC of any changes to the protocol after the approval of the Committee has been obtained using the USQ HREC Amendment Application form;
- have read and agree to comply with the University of Southern Queensland Research Data Management Policy and pursuant policies and procedures and have a plan for managing and/or sharing Research Data securely; and
- understand and agree that study files and documents and research records and data may be subject to inspection by the University of Southern Queensland, USQ HREC, research integrity officer, the sponsor or an independent body for audit and monitoring purposes.

Name (please print)	Signature	Date
Morteza Tehrani	Tehrani X Morteza Tehrani Mr	14 May 2018

Approval No: …………………….

UNIVERSITY OF SOUTHERN QUEENSLAND

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM

The Effect of Mood/Rewards on Performance in Non-Normal Situations

You are invited to participate in a study titled '*The Effect of Mood/Rewards on Performance in Non-Normal Situations'*. I, Morteza Tehrani hope to learn about the interrelationship between mood/reward and performance in the non-normal situations within aviation. This study will provide valuable safety information which can be utilised in any socio-technical environment. You are selected as a possible participant in this study because of your interest in education.

If you decide to participate, you will be asked to complete a consent form (below), a Motivational Trait Questionnaire (MTQ) followed by a POMS-SF questionnaire. Then, you will be randomly selected to participate in one of the three groups (i.e., Group A, B or C) and you will be asked to view pre-flight safety briefing based on a generic commercial Regular Public Transport (RPT) scenario. Following the presentation of the videos, you will be asked to complete a second POMS – SF questionnaire, a MTQ form and a comprehension test form relating to the topics presented in the pre-flight safety briefing. The total time to complete the study will take no longer than 30 minutes.

The personal benefits for you participating in the research are limited to the receipt of a $10 bookshop gift voucher. From the wider community's perspective, the expected benefit of the research is improved understanding the relationship between mood and performance in non-normal situations.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission, except as required by law. If you give us your permission by signing this document, we plan to publish the results in journals and conference proceedings. In any publication, information will be provided in such a way that you cannot be identified. Your information will be securely stored within the School of Commerce at USQ.

Complaints may be directed to the Ethics Secretariat, University of Southern Queensland, West Street, Toowoomba Qld 4350 Australia (phone 61 7 4631 2690, email: human.ethics@usq.edu.au). Any complaint you make will be investigated promptly and you will be informed out the outcome.

Your decision whether or not to participate will not prejudice your future relations with the University of Southern Queensland. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without prejudice.

Should you have any questions, please feel free to ask us. If you have any additional questions later, Mr Morteza Tehrani (u1091419@umail.usq.edu.au Ph. 042 404 5306 will be happy to answer them.
You will be given a copy of this form to keep.

UNIVERSITY OF SOUTHERN QUEENSLAND AND AFFILIATED ORGANISATION[S]

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM (continued)

The Effect of Mood/Rewards on Performance in Non-Normal Situations

You are making a decision whether or not to participate. Your signature indicates that, having read the information provided above, you have decided to participate.

…………………………………...	………………………………
Signature of Research Participant	Signature of Witness
…………………………………...	………………………………
(Please PRINT name)	(Please PRINT name)
…………………………………...	………………………………
Date	Nature of Witness

REVOCATION OF CONSENT

The Effect of Mood/Rewards on Performance in Non-Normal Situations

I hereby wish to WITHDRAW my consent to participate in the research proposal described above and understand that such withdrawal WILL NOT jeopardise any treatment or my relationship with University of Southern Queensland, (other participating organisation[s] or other professional[s]).

…………………………………...	………………………………
Signature	Date

Please PRINT Name

The section for Revocation of Consent should be forwarded to Mr Morteza Tehrani, University of Southern Queensland Toowoomba QLD 4350 Australia (mtehrani@ozemail.com.au)

Control Group Total Mood Disturbance (TMD) Before & After watching Video

Participant	POMS Before Video	1 Unhappy	2 Sad	3 Blue	4 Hopeless	5 Discouraged	6 Miserable	7 Helpless	8 Worthless	DEPRESSION MEAN	9 Lively	10 Active	11 Energetic	12 Cheerful	13 Full of pep	14 Vigorous	VIGOUR MEAN
1	[illegible]	1	[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	4	3	4	[illegible]	[illegible]	25
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	2	2	2	2	2	22
3	[illegible]	1	1	[illegible]	[illegible]	1	[illegible]	1	[illegible]	[illegible]	3	3	4	4	4	2	33
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	2	1	1	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	1	2	4	3	[illegible]	22
6	[illegible]	1	3	1	3	4	3	[illegible]	[illegible]	19	2	2	2	1	[illegible]	4	[illegible]
7	[illegible]	1	[illegible]	[illegible]	3	2	[illegible]	[illegible]	3	11	3	2	4	4	4	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	3	2	[illegible]	[illegible]	[illegible]	13
9	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	3	2	3	2	[illegible]	22
10	[illegible]	0	0	0	0	0	0	0	0	[illegible]	0	2	3	3	0	0	13
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	2	1	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	2	3	4	3	[illegible]	25
13	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	4	3	3	3	3	33
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	3	2	4	1	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	2	2	1	[illegible]	[illegible]	[illegible]
17	[illegible]	1	1	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	2	1	1	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	3	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	1	3	[illegible]	1	1	15
21	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	2	[illegible]	1	12
22	[illegible]	1	[illegible]	[illegible]	1	[illegible]	3	[illegible]	[illegible]	[illegible]	3	3	3	2	[illegible]	1	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	2	3	2	2	22
24	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	3	3	3	1	2	25
25	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]	3	4	4	4	2	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	3	3	[illegible]	[illegible]	15
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	2	3	2	[illegible]	[illegible]

Participant	15 Angry	16 Peeved	17 Annoyed	18 Grouchy	19 Resentful	20 Bitter	21 Furious	ANGER MEAN	22 Tense	23 On edge	24 Uneasy	25 Restless	26 Nervous	27 Anxious	TENSION MEAN
1	[illegible]	2	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	1	1	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	1	[illegible]	3	[illegible]	2	[illegible]
4	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	2	2	1	[illegible]	2	[illegible]	[illegible]	1	3	4	2	2	1	22
7	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	2	2	3	1	[illegible]
8	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	1	1	1	1	1	1	[illegible]
10	0	0	0	0	0	0	0	[illegible]	0	0	0	0	0	0	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	2	3	1	[illegible]	[illegible]	1	[illegible]	[illegible]	3	1	1	3	1	1	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	[illegible]	2	1	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	[illegible]	2	1	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	4	[illegible]	2	3	2	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	1	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	1	2	2	[illegible]

Participant	28 Confused	29 Unable to concentrate	30 Bewildered	31 Forgetful	32 Uncertain	CONFUSION MEAN	33 Worn out	34 Fatigued	35 Exhausted	36 Weary	37 Bushed	FATIGUE MEAN	TMD Before
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	1	2	[illegible]	[illegible]	3	3	2	[illegible]	[illegible]	[illegible]
3	2	3	1	[illegible]	[illegible]	[illegible]	4	2	2	1	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	1	1	[illegible]	1	[illegible]	[illegible]
6	4	1	3	4	2	[illegible]	4	3	4	2	3	[illegible]	[illegible]
7	2	1	[illegible]	2	[illegible]	[illegible]	2	4	4	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	3	1	1	[illegible]	[illegible]	[illegible]
9	1	[illegible]	[illegible]	[illegible]	1	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	0	0	0	0	0	[illegible]	0	0	0	0	0	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	2	2	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	1	1	[illegible]	[illegible]	1	[illegible]	1	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	3	1	1	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	2	1	[illegible]	1	1	[illegible]	[illegible]	1	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	1	1	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]
17	2	3	[illegible]	3	1	[illegible]	4	4	3	[illegible]	[illegible]	[illegible]	[illegible]
18	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	2	4	4	2	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	1	[illegible]	[illegible]	[illegible]
21	3	2	1	2	2	[illegible]	2	3	3	4	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	3	2	3	1	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	1	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]
26	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27	[illegible]	1	[illegible]	1	[illegible]	[illegible]	2	[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]

Total Mood Disturbance (TMD) = [Anger + Confusion + Depression + Fatigue + Tension] + (24 − Vigour)

McNair, D. M., Lorr, M. & Droppleman, L. F. (1971) EdITS Manual for the Profile of Mood States, San Diego, CA: Educational and Industrial Testing Service.

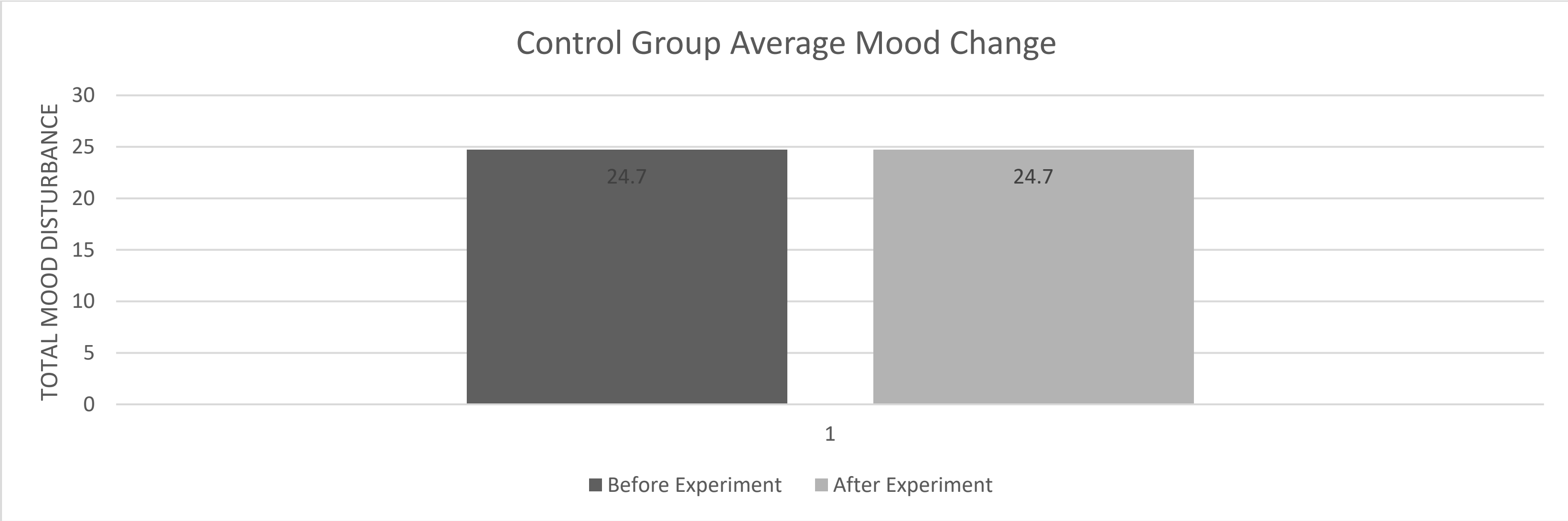
Participant	POMS After Video	1 Unhappy	2 Sad	3 Blue	4 Hopeless	5 Discouraged	6 Miserable	7 Helpless	8 Worthless	DEPRESSION MEAN	9 Lively	10 Active	11 Energetic	12 Cheerful	13 Full of pep	14 Vigorous	VIGOUR MEAN
1	[illegible]	1	[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	4	3	4	[illegible]	[illegible]	25
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	2	2	2	2	2	22
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	4	4	4	3	1	32
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	3	3	4	3	[illegible]	[illegible]
6	[illegible]	2	3	1	3	4	3	[illegible]	4	25	2	1	1	1	3	2	[illegible]
7	[illegible]	3	[illegible]	[illegible]	2	3	[illegible]	[illegible]	2	13	1	1	2	3	2	[illegible]	15
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	[illegible]	2	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	2	2	2	2	[illegible]	[illegible]
10	[illegible]	0	0	0	0	0	0	0	0	[illegible]	0	2	2	3	0	0	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	2	1	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	2	[illegible]	3	[illegible]	15
13	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	3	3	2	3	2	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	2	2	3	2	2	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	1	1	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	1	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	3	3	2	[illegible]	2	22
22	[illegible]	[illegible]	2	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	1	[illegible]	1	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	1	2		1	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	2	2	2	2	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	4	[illegible]	3	4	4	4	[illegible]	[illegible]	25
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	3	2	2	[illegible]	[illegible]	[illegible]
27	[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	3	2	1	[illegible]	13

Participant	15 Angry	16 Peeved	17 Annoyed	18 Grouchy	19 Resentful	20 Bitter	21 Furious	ANGER MEAN	22 Tense	23 On edge	24 Uneasy	25 Restless	26 Nervous	27 Anxious	TENSION MEAN
1	[illegible]	2	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	1	1	1	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	2	3	1	[illegible]	2	[illegible]	11	1	3	4	2	2	3	25
7	[illegible]	[illegible]	3	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	2	[illegible]	1	[illegible]
9	[illegible]	[illegible]	1	[illegible]	[illegible]	1	[illegible]	[illegible]	1	1	1	1	1	1	[illegible]
10	0	0	0	0	0	0	0	[illegible]	0	0	0	0	0	0	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]
13	[illegible]	[illegible]	1	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	2	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	1	[illegible]	1		[illegible]	[illegible]	[illegible]	[illegible]	3	[illegible]	[illegible]	3	1	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	1	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	3	[illegible]	[illegible]	3	2	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

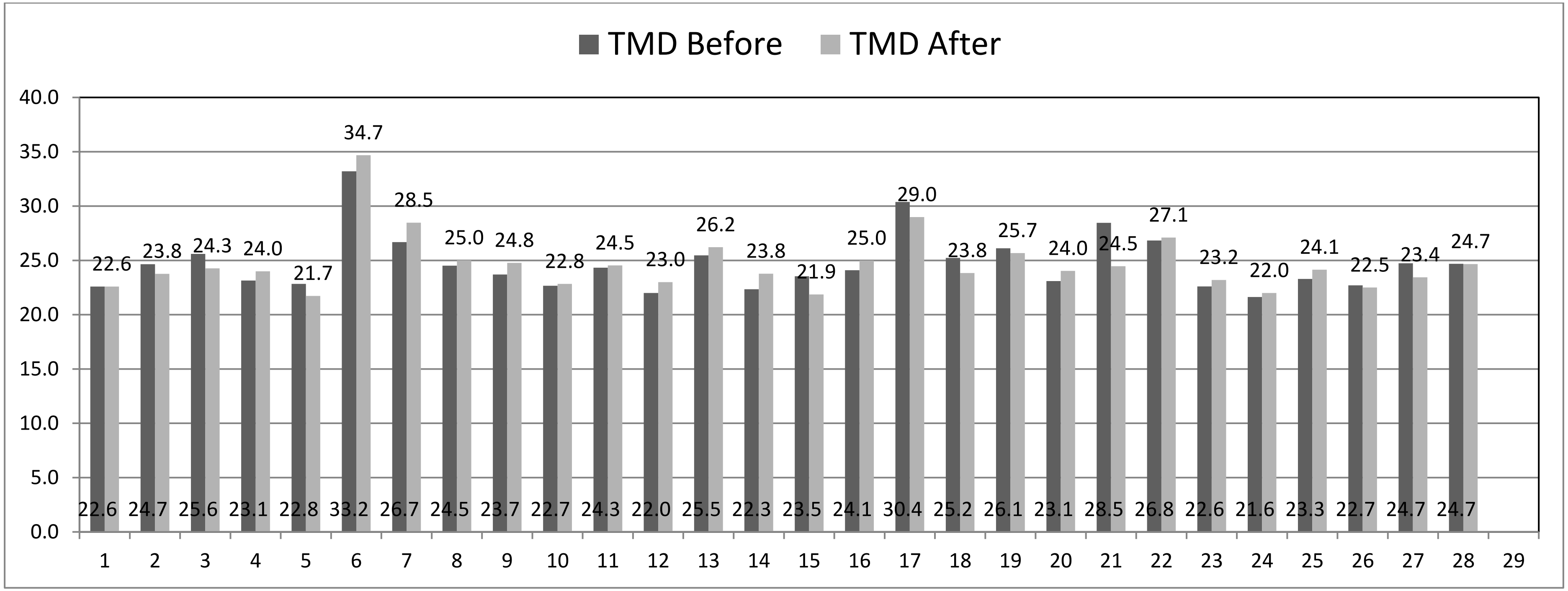
Participant	28 Confused	29 Unable to concentrate	30 Bewildered	31 Forgetful	32 Uncertain	CONFUSION MEAN	33 Worn out	34 Fatigued	35 Exhausted	36 Weary	37 Bushed	FATIGUE MEAN	TMD After
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	1	2	[illegible]	[illegible]	2	2	1	[illegible]	[illegible]	[illegible]
3	2	2	[illegible]	2	1	[illegible]	2	2	2	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	4	2	3	4	2	[illegible]	4	3	4	2	3	[illegible]	[illegible]
7	1	3	[illegible]	[illegible]	[illegible]	[illegible]	4	4	4	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	1	1	[illegible]	[illegible]	[illegible]
9	1	1	[illegible]	[illegible]	1	[illegible]	1	1	1	[illegible]	[illegible]	[illegible]	[illegible]
10	0	0	0	0	0	[illegible]	0	0	0	0	0	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	3	2	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	1	2	[illegible]	[illegible]	1	[illegible]	2	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	1	[illegible]	[illegible]	1	[illegible]	3	2	2	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	1	2	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]
17	2	4	[illegible]	1	[illegible]	[illegible]	4	4	2	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	3	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]
21	1	[illegible]	[illegible]	1	[illegible]	[illegible]	1	2	3	2	[illegible]	[illegible]	[illegible]
22	1	1	[illegible]	[illegible]	3	[illegible]	[illegible]	1	1	[illegible]	1	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	1	1	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]

Descriptive Analyses – Control Group

	TMD Before	**TMD After**	**Age**	**Male**	**Female**	**Male**	**Female**				
1	22.60	22.60	60	1		60	32		F-Test Two-Sample for Variances		
2	24.65	23.77	32		1	22	18				
3	25.60	24.27	22	1		18	18			*Variable 1*	*Variable 2*
4	23.14	24.00	18	1		18	18		Mean	24.661	24.682
5	22.83	21.73	18		1	18	18		Variance	7.263	7.054
6	33.21	34.68	18		1	22	18		Observations	27.000	27.000
7	26.68	28.47	18		1	28	18		df	26.000	26.000
8	24.52	25.01	18	1		18	18		F	1.030	
9	23.70	24.78	18	1		18	20		P(F<=f) one-tail	0.471	
10	22.67	22.83	18		1	45	24		F Critical one-tail	1.929	
11	24.33	24.53	18		1	66	25				
12	22.00	23.00	18		1	21	25		t-Test: Two-Sample Assuming Equal Variances		
13	25.47	26.21	18		1		44				
14	22.34	23.78	20		1		31			*Variable 1*	*Variable 2*
15	23.53	21.87	24		1		18		Mean	24.682	24.661
16	24.10	24.98	25		1				Variance	7.054	7.263
17	30.38	28.98	22	1					Observations	27.000	27.000
18	25.23	23.83	28	1					Pooled Variance	7.159	
19	26.11	25.68	25		1				Hypothesized Mean Difference	0.000	
20	23.10	24.03	44		1				df	52.000	
21	28.46	24.46	18	1					t Stat	0.028	
22	26.83	27.10	18	1					P(T<=t) one-tail	0.489	
23	22.60	23.20	45	1					t Critical one-tail	1.675	
24	21.63	22.00	66	1					P(T<=t) two-tail	0.977	
25	23.30	24.14	21	1					t Critical two-tail	2.007	
26	22.70	22.50	31		1						
27	24.73	23.44	18		1						
Mean	**24.68**	**24.66**	**25.89**			**29.50**	**23.00**				
Variance	**7.05**	**7.26**	**170.64**								
SD	**2.78**	**2.70**	**13.06**								
Count				**12**	**15**						


Control Group Average Mood Change
TOTAL MOOD DISTURBANCE
30
25
20
15
10
5
0
24.7
24.7
1
Before Experiment
After Experiment

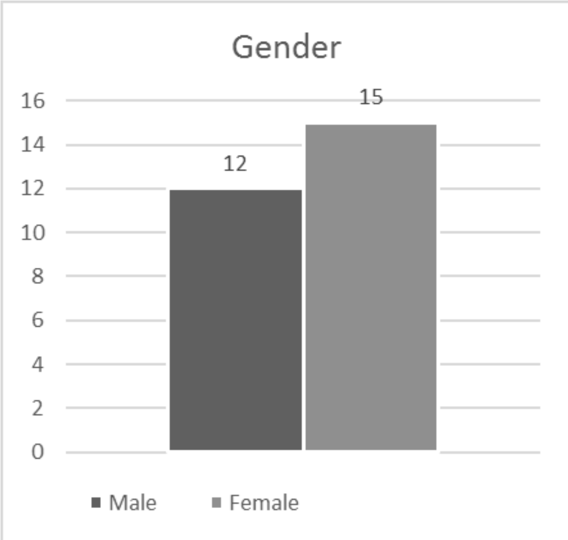
Control Group TMD



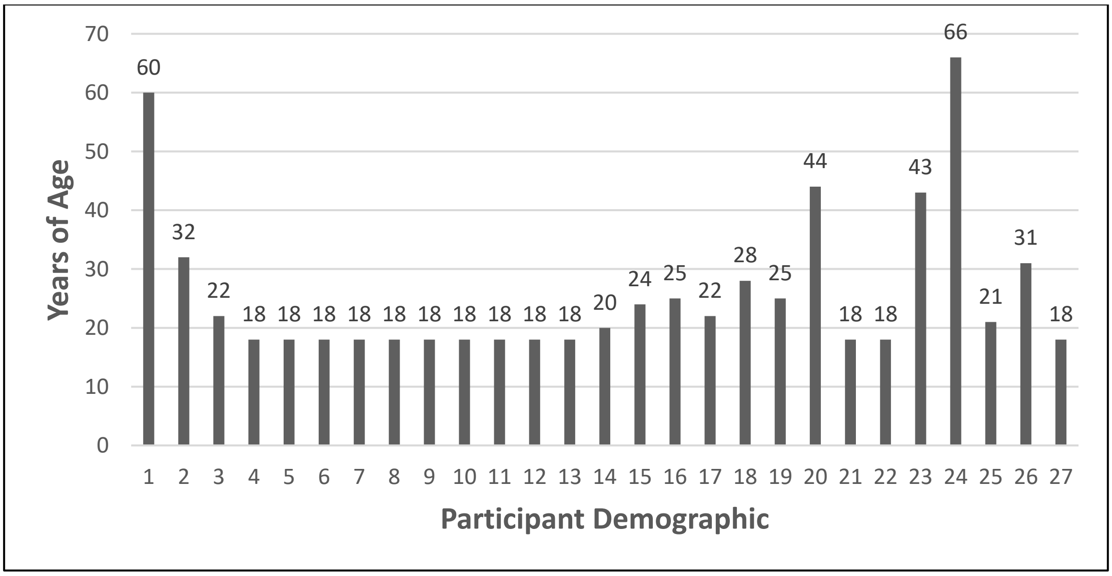
Control Group - Items Remembered

Candidates	Items Remembered (%)
1	18%
2	38%
3	38%
4	35%
5	44%
6	32%
7	44%
8	32%
9	53%
10	53%
11	65%
12	74%
13	50%
14	50%
15	32%
16	38%
17	41%
18	53%
19	26%
20	32%
21	32%
22	35%
23	48%
24	35%
25	21%
26	21%
27	38%
Mean	40%

Control Group – Age & Gender



	Male	Female
1	60	32
2	22	18
3	18	18
4	18	18
5	18	18
6	22	18
7	28	18
8	18	18
9	18	20
10	45	24
11	66	25
12	21	25
13		44
14		31
15		18
Average Age	29.5	21



Reward Group TMD Prior and After Watching Video

PARTICIPANT	POMS Before Video	1	2	3	4	5	6	7	8		9	10	11	12	13	14	
		DEPRESSION								MEAN	VIGOR						MEAN
		Unhappy	Sad	Blue	Hopeless	Discouraged	Miserable	helpless	worthless		Lively	Active	Energetic	Cheerful	Full of pep	Vigorous	
1	Video	0	0	0	0	0	0	0	0	0.0	2	1	1	2	0	0	1.0
2	Video	0	0	0	2	1	1	1	1	0.8	1	1	3	2	0	0	1.2
3	Video	0	0	0	0	0	0	0	2	0.3	2	1	2	2	0	0	1.2
4	Video	0	0	0	1	0	0	1	2	0.5	3	1	3	3	0	0	1.7
5	Video	2	3	0	2	1	2	2	2	1.8	3	3	3	2	0	0	1.8
6	Video	2	2	0	0	1	1	0	0	0.8	2	1	2	1	0	0	1.0
7	Video	0	0	0	0	0	0	0	0	0.0	2	2	2	2	2	0	1.7
8	Video	0	0	2	0	0	3	0	0	0.6	2	2	2	0	2	3	1.8
9	Video	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0.0
10	Video	0	0	0	0	0	0	0	0	0.0	3	2	3	4	2	2	2.7
11	Video	0	0	0	0	0	0	0	0	0.0	1	1	2	4	3	2	2.2
12	Video	0	0	0	0	0	0	0	0	0.0	1	0	2	2	0	1	1.0
13	Video	2	0	0	0	2	0	0	0	0.5	0	0	0	0	0	0	0.0
14	Video	1	1	0	0	0	0	0	0	0.3	3	4	3	4	4	3	3.5
15	Video	0	0	0	0	0	0	0	0	0.0	2	3	2	3	2	2	2.3
16	Video	0	0	0	0	0	0	0	0	0.0	2	4	1	4	4	4	3.2
17	Video	0	0	0	1	1	1	1	1	0.6	0	0	0	0	0	0	0.0
18	Video	0	0	3	0	0	1	0	0	0.5	3	4	3	3	1	0	2.3
19	Video	0	0	0	1	0	0	1	0	0.3	1	1	0	3	0	2	1.2
20	Video	0	0	0	0	0	0	0	0	0.0	2	0	1	0	0	0	0.5
21	Video	0	0	0	0	0	0	0	0	0.0	0	1	1	1	0	0	0.5
22	Video	2	1	1	1	2	0	1	1	1.1	0	0	0	0	0	0	0.0
23	Video	0	0	2	0	1	0		0	0.4	1	2	2	3	0	0	1.3
24	Video	1	0	1	0	1	1	0	0	0.5	0	0	0	1	0	1	0.3
25	Video	1	1	0	1	1	2	0	0	0.8	2	2	3	3	0	2	2.0
26	Video	0	0	1	0	0	0	1	0	0.3	4	3	2	4	0	0	2.2

PARTICIPANT	15	16	17	18	19	20	21		22	23	24	25	26	27	
	ANGER							MEAN	TENSION						MEAN
	Angry	Peeved	Annoyed	Grouchi	Resentful	Bitter	Furious		Tense	On edge	Uneasy	Restless	Nervous	Anxious	
1	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0.0
2	0	0	0	0	0	0	0	0.0	2	0	1	0	0	0	0.5
3	1	0	1	1	0	1	1	0.7	0	0	0	0	0	0	0.0
4	0	0	0	0	0	0	0	0.0	0	0	0	2	1	1	0.7
5	0	3	1	0	2	3	1	1.4	0	0	1	2	0	0	0.5
6	2	1	1	0	1	0	0	0.7	3	0	1	0	0	0	0.7
7	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0.0
8	1	3	2	4	0	0	0	1.4	0	0	0	2	0	0	0.3
9	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0.0
10	0	0	0	0	0	0	0	0.0	1	1	0	1	1	1	0.8
11	0	1	1	0	0	0	0	0.3	0	0	0	0	0	0	0.0
12	0	1	0	0	0	0	0	0.1	0	0	0	0	0	0	0.0
13	0	0	2	3	2	0	0	1.0	0	0	0	0	0	0	0.0
14	0	0	0	0	0	0	0	0.0	0	0	0	4	0	0	0.7
15	0	0	0	0	0	0	0	0.0	0	0	0	1	0	0	0.2
16	0	0	0	0	0	0	0	0.0	0	0	0	0	2	0	0.3
17	0	0	0	0	0	0	0	0.0	0	0	0	0	1	0	0.2
18	0	1	0	1	1	1	1	0.7	0	1	0	0	1	1	0.5
19	0	0	1	1	1	1	0	0.6	1	1	1	1	1	1	1.0
20	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0.0
21	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0.0
22	2	2	3	1	2	1	0	1.6	3	1	2	2	3	1	2.0
23	0	0	0	0	0	0	0	0.0	2	1	0	1	1	0	0.8
24	1	1	1	2	0	2	0	1.0	1	2	1	0	1	1	1.0
25	1	0	3	2	2	1	0	1.3	3	1	1	2	1	1	1.5
26	0	0	0	1	1	0	0	0.3	0	0	0	0	0	0	0.0

PARTICIPANT	28	29	30	31	32		33	34	35	36	37		
	CONFUSION					MEAN	FATIGUE					MEAN	TMD
	Confused	Unable to concentrate	Bewildered	Forgetful	Uncertain		Worn out	Fatigued	Exhausted	Weary	Bushed		Before
1	0	1	0	1	0	0.4	1	0	0	0	0	0.2	23.6
2	1	1	0	0	0	0.4	0	0	0	0	0	0.0	24.5
3	0	2	0	1	0	0.6	0	1	1	0	0	0.4	24.8
4	1	1	0	1	1	0.8	2	3	2	1	0	1.6	25.9
5	1	1	0	1	0	0.6	0	0	0	0	0	0.0	26.4
6	0	0	0	0	0	0.0	1	0	0	1	0	0.4	25.5
7	0	0	0	0	0	0.0	0	0	0	0	0	0.0	22.3
8	0	1	1	2	1	1.0	3	1	2	1	0	1.4	27.0
9	0	0	0	1	0	0.2	0	0	2	0	1	0.6	24.8
10	0	1	0	1	0	0.4	0	1	0	0	0	0.2	22.8
11	1	0	1	1	0	0.6	2	1	2	1	1	1.4	24.1
12	0	1	0	0	0	0.2	0	1	1	0	1	0.6	23.9
13	0	3	0	0	0	0.6	4	4	3	4	0	3.0	29.1
14	2	1	0	3	0	1.2	1	1	0	0	0	0.4	23.0
15	0	0	0	1	0	0.2	1	1	1		0	0.8	22.8
16	0	2	0	0	0	0.4	3	1	2	0	1	1.4	23.0
17	1	0	0	0	1	0.4	0	0	0	1	0	0.2	25.4
18	0	1	1	1	1	0.8	1	0	1	0	0	0.4	24.6
19	1	3	0	4	3	2.2	3	1	2	1	2	1.8	28.7
20	1	2	0	0	0	0.6	0	0	1	0	0	0.2	24.3
21	0	0	0	0	0	0.0	0	0	0	0	0	0.0	23.5
22	1	2	0	0	1	0.8	3	2	1	1	0	1.4	30.9
23	1	0	1	2	0	0.8	1	2	0	0	0	0.6	25.3
24	0	1	0	1	2	0.8	2	3	2	1	0	1.6	28.6
25	1	1	0	1	0	0.6	2	2	2	1	0	1.4	27.5
26	2	0	3	0	1	1.2	0	0	0	0	0	0.0	23.6

Total Mood Disturbance (TMD) = (Anger +Confusion+Dipression+Fatigue + Tension + (24 - Vigor)

McNair, D. M., Lorr, M. & Droppleman, L. F. (1971) *EdITS Manual for the Profile of Mood States,* San Diego, CA, Educational and Industrial Testing Service.

PARTICIPANT	POMS After Video	1	2	3	4	5	6	7	8		9	10	11	12	13	14	
		DEPRESSION								MEAN	VIGOR						MEAN
		Unhappy	Sad	Blue	Hopeless	Discouraged	Miserable	helpless	worthless		Lively	Active	Energetic	Cheerful	Full of pep	Vigorous	
1	Video	1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.0
2	Video	1	0	0	0	2	0	1		0.6	0	0	0	0	0	0	0.0
3	Video	2	1	1	0	2	1	1	1	1.1	0	0	0	0	0	1	0.2
4	Video	0	0	0	1	0	0	1	0	0.3	1	1	1	2	2	0	1.2
5	Video	3	3	0	2	2	2	1	1	1.8	1	1	1	0	0	1	0.7
6	Video	0	1	0	0	1	0	0	0	0.3	1	1	0	0	0	0	0.3
7	Video	0	0	0	0	0	0	1	0	0.1	0	0	0	0	0	0	0.0
8	Video	0	0	2	0	0	3	0	0	0.6	2	2	2	0	2	3	1.8
9	Video	0	0	1	0	0	0	0	0	0.1	1	1	1	0	1	1	0.8
10	Video	0	0	0	0	0	0	0	0	0.0	3	2	2	3	2	2	2.3
11	Video	0	3	0	0	0	0	0	0	0.4	2	2	2	4	3	3	2.7
12	Video	0	0	0	0	0	0	0	0	0.0	0	0	1	0	0	0	0.2
13	Video	1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.0
14	Video	0	0	0	0	2	0	0	0	0.3	3	3	3	3	3	3	3.0
15	Video	0	0	0	0	0	0	0	0	0.0	2	3	3	3	3	0	2.3
16	Video	0	0	0	0	0	0	0	0	0.0	0	4	2	0	0	0	1.0
17	Video	1	1	1	1	0	1	1	1	0.9	0	0	0	0	0	0	0.0
18	Video	1	0	1	0	0	0	0	0	0.3	0	3	2	0	0	0	0.8
19	Video	1	0	1	1	0	0	0	0	0.4	0	0	0	1	0	0	0.2
20	Video	0	0	0	0	0	0	0	0	0.0	2	3	3	0	0	0	1.3
21	Video	3	0	3	2	1	0	0	0	1.1	0	0	0	0	0	0	0.0
22	Video	3	1	0	0	2	0	0	1	0.9	1	0	0	0	0	0	0.2
23	Video	0	1	1	2	0	0	0	2	0.8	1	0	0	0	3	1	0.8
24	Video	1	0	2	1	1	2	0	0	0.9	0	1	2	3	1	3	1.7
25	Video	2	1	2	2	0	0	1	0	1.0	1	0	0	0	0	1	0.3
26	Video	0	0	1	0	0	0	1	0	0.3	4	3	2	3	2	0	2.3

PARTICIPANT	15	16	17	18	19	20	21		22	23	24	25	26	27	
	ANGER							MEAN	TENSION						MEAN
	Angry	Peeved	Annoyed	Grouchi	Resentful	Bitter	Furious		Tense	On edge	Uneasy	Restless	Nervous	Anxious	
1	0	1	3	0	0	0	0	0.6	0	0	0	0	0	0	0.0
2	2	0	3	1	2	0	1	1.3	3	1	0	0	1	1	1.0
3	3	3	3	3	1	3	1	2.4	2	1	1	0	2	1	1.2
4	0	1	1	0	0	0	0	0.3	0	0	0	1	0	0	0.2
5	1	1	1	0	1	1	1	0.9	0	0	0	0	1	0	0.2
6	0	1	2	0	1	0	0	0.6	0	0	0	0	0	0	0.0
7	0	0	0	1	1	0	0	0.3	0	1	0	1	0	0	0.3
8	1	3	2	4	0	0	0	1.4	0	0	0	2	0	0	0.3
9	0	1	0	1	0	0	0	0.3	0	0	0	0	0	0	0.0
10	0	1	0	0	0	0	0	0.1	1	0	0	0	0	0	0.2
11	0	0	3	2	1	1		1.2	0	0	0	0	0	0	0.0
12	0	1	1	0	0	0	0	0.3	0	0	0	1	0	0	0.2
13	0	1	2	3	0	0	0	0.9	0	1	0	2	0	0	0.5
14	0	0	0	0	0	0	0	0.0	1	1	0	4	0	1	1.2
15	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0.0
16	0	0	0	2	0	0	0	0.3	0	3	0	2	0	0	0.8
17	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0.0
18	1	0	1	0	0	0	0	0.3	1	0	0	0	0	0	0.2
19	0	0	1	1	1	1	0	0.6	1	2	1	2	2	1	1.5
20	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0.0
21	3	3	4	3	0	0	2	2.1	3	4	0	0	0	1	1.3
22	4	2	2	2	2	2	0	2.0	4	2	0	1	1	1	1.5
23	1	0	1	0	0	1	2	0.7	2	0	0	0	1	1	0.7
24	1	1	0	1	0	1	0	0.6	2	1	0	1	0	1	0.8
25	0	0	1	1	0	2	0	0.6	1	1	0	0	1	1	0.7
26	0	0	0	0	1	1	0	0.3	0	0	0	0	1	0	0.2

PARTICIPANT	28	29	30	31	32		33	34	35	36	37		
	CONFUSION					MEAN	FATIGUE					MEAN	TMD
	Confused	Unable to concentrate	Bewildered	Forgetful	Uncertain		Worn out	Fatigued	Exhausted	Weary	Bushed		After
1	0	1	0	0	0	0.2	1	0	0	0	0	0.2	25.1
2	0	3	2	1	1	1.4	2	3	0	0	1	1.2	29.5
3	2	0	1	1	2	1.2	2	0	3	1	1	1.4	31.2
4	2	2	0	1	1	1.2	1	1	1	1	0	0.8	25.5
5	0	2	0	1	1	0.8	1	1	2	0	1	1.0	27.9
6	1	1	0	0	0	0.4	0	0	0	0	0	0.0	24.9
7	0	0	0	0	0	0.0	0	1	0	0	0	0.2	24.9
8	0	1	1	2	1	1.0	3	1	2	1	0	1.4	27.0
9	0	0	0	0	0	0.0	1	0	1	0	0	0.4	24.0
10	0	1	0	0	0	0.2	1	0	0	0	0	0.2	22.4
11	0	0	3	1	0	0.8	1	1	1	1	1	1.0	24.7
12	0	2	1	0	2	1.0	0	1	0	0	0	0.2	25.5
13	2	1	1	0	0	0.8	4	4	3	3	3	3.4	29.7
14	3	3	3	3	4	3.2	0	0	0	0	0	0.0	25.6
15	0	0	0	1	0	0.2	0	1	1	1	0	0.6	22.5
16	0	2	0	0	0	0.4	0	0	2	0	0	0.4	24.9
17	0	0	0	0	0	0.0	0	0	0	0	0	0.0	24.9
18	1	1	0	1	1	0.8	2	1	1	0	0	0.8	25.5
19	1	2	3	2	1	1.8	2	1	3	0	2	1.6	29.7
20	0	3	0	0	2	1.0	0	0	1	0	0	0.2	23.9
21	0	0	0	3	0	0.6	3	0	3	0	3	1.8	31.0
22	0	0	0	0	0	0.0	3	0	2	0	0	1.0	29.2
23	1	1	0	2	1	1.0	0	2	1	1	0	0.8	27.1
24	1	0	3	3	1	1.6	2	3	2	2	2	2.2	28.4
25	3	0	0	0	0	0.6	1	0	3	1	0	1.0	27.5
26	0	1	3	3	1	1.6	0	1	1	0	0	0.4	24.4

Descriptive Analyses - Reward Group

	TMD Before	TMD After	
F	23.6	25.1	
M	24.5	29.5	
F	24.8	31.2	
F	25.9	25.5	
M	26.4	27.9	
M	25.5	24.9	
F	22.3	24.9	
M	27.0	27.0	
M	24.8	24.0	
F	22.8	22.4	
F	24.1	24.7	
F	23.9	25.5	
M	29.1	29.7	
F	23.0	25.6	
F	22.8	22.5	
M	23.0	24.9	
F	25.4	24.9	
M	24.6	25.5	
M	28.7	29.7	
M	24.3	23.9	
F	23.5	31.0	
F	30.9	29.2	
M	25.3	27.1	
M	28.6	28.4	
M	27.5	27.5	
F	23.6	24.4	
	25.2	26.4	Average TMD

Participant	TMD Before	TMD After	Age	Male	Female	Male	Female
1	23.60	25.10	18		1	18	18
2	24.48	29.46	18	1		18	18
3	24.80	31.15	18		1	18	18
4	25.90	25.54	18		1	49	40
5	26.45	27.91	18	1		64	18
6	25.53	24.89	18	1		66	50
7	22.33	24.94	40		1	21	41
8	26.95	26.95	49	1		18	18
9	24.80	23.98	64	1		18	41
10	22.77	22.38	18		1	21	23
11	24.12	24.68	50		1	18	21
12	23.94	25.49	41		1	18	32
13	29.10	29.68	66	1		22	42
14	23.02	25.62	18		1		
15	22.83	22.47	41		1		
16	22.97	24.92	21	1			
17	25.39	24.88	23		1		
18	24.58	25.47	18	1			
19	28.65	29.68	18	1			
20	24.30	23.87	21	1			
21	23.50	31.00	21		1		
22	30.90	29.21	32		1		
23	25.33	27.10	18	1			
24	28.57	28.41	18	1			
25	27.54	27.50	22	1			
26	23.57	24.37	42		1		
Mean	**25.23**	**26.41**	**28.81**			**28.38**	**29.23**
Variance	**4.96**	**6.22**	**230.00**				
SD	**2.23**	**2.49**	**15.17**				
Count				**13**	**13**		
Staff							

F-Test Two-Sample for Variances

	Variable 1	*Variable 2*
Mean	26.41	25.23
Variance	6.22	4.96
Observations	26.00	26.00
df	25.00	25.00
F	1.25	
P(F<=f) one-tail	0.29	
F Critical one-tail	1.96	

t-Test: Two-Sample Assuming Unequal Variances

	Variable 1	*Variable 2*
Mean	25.23	26.41
Variance	4.96	6.22
Observations	26.00	26.00
Hypothesized Mean Difference	0.00	
df	49.00	
t Stat	-1.80	
P(T<=t) one-tail	0.04	
t Critical one-tail	1.68	
P(T<=t) two-tail	0.08	
t Critical two-tail	2.01	

Hypothesis:Group 2 TMD is defferent than Group 1(one tailed)

if variance in column 1 is less than the variance in column 2 then, switch the data.

Second, compare the F value with Critical F value. if F value is less than F critical value you can not reject H0 or, there is not enough evidance to support an alternate hypothesis - Failed to reject H0.

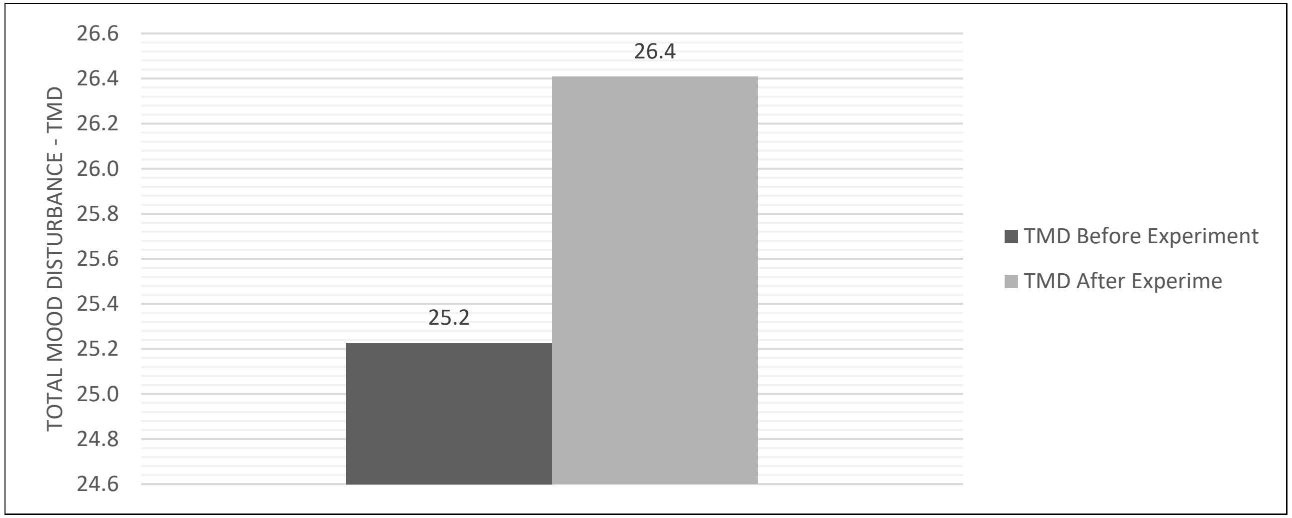
Descriptive Analysis

TMD Before		*TMD After*	
Mean	25.23	Mean	26.41
Standard Error	0.44	Standard Error	0.49
Median	24.69	Median	25.51
Mode	#N/A	Mode	#N/A
Standard Deviation	2.23	Standard Deviation	2.49
Sample Variance	4.96	Sample Variance	6.22
Kurtosis	0.28	Kurtosis	-0.79
Skewness	0.95	Skewness	0.41
Range	8.56	Range	8.78
Minimum	22.33	Minimum	22.38
Maximum	30.90	Maximum	31.15
Sum	655.91	Sum	686.62
Count	26.00	Count	26.00

The mean TMD value of the Reward group before watching **video (M = 25.23, SD = 2.23, n = 26)** is less than the TMD value after watching video **(M = 26.41, SD = 2.49, n = 26)** - higher value of TMD means reduced mood.
This difference is significant**, t(49) = (-1.76, *p* = .04 (1 tails)** Hence, this is in contrast with our hypothesis. This can be further analysed by creating sub-groups based on their ages (i.e., students and staff as participants).

t Stat + *p* value = -1.80 + .04 = -1.76

Reward Group TMD Graphic



For Reward group the average TMD Prior to the Experiment is less than after the experiment (i.e., as TMD increases mood reduces or deteriorates!). This result is in contrast with our hypothesis. Further analyses is required by T test between two groups.

Reward Group T – Test & TMD

Staff only	TMD Before	TMD After	Age
1	22.3	24.9	40
2	27.0	27.0	49
3	24.8	24.0	64
4	24.1	24.7	50
5	23.9	25.5	41
6	29.1	29.7	66
7	22.8	22.5	41
8	30.9	29.2	32
9	23.6	24.4	42
Mean	25.39	25.75	47.22
Variance	8.72	5.82	129.19
SD	2.95	2.41	11.37
Count			9

F-Test Two-Sample for Variances

	TMD Before	*TMD After*
Mean	25.39	25.75
Variance	8.72	5.82
Observations	9.00	9.00
df	8.00	8.00
F	1.50	
P(F<=f) one-tail	0.29	
F Critical one-tail	4.43	

t-Test: Two-Sample Assuming Unequal Variances

	TMD Before	*TMD After*
Mean	25.39	25.75
Variance	8.72	5.82
Observations	9.00	9.00
Hypothesized Mean Difference	0.00	
df	15.00	
t Stat	-0.28	
P(T<=t) one-tail	0.39	
t Critical one-tail	2.13	
P(T<=t) two-tail	0.78	
t Critical two-tail	2.49	

This analysis further reveals that the mood of the staff with higher age group was not affected by the Rewards. However, the students with significant average age difference(mean 47.22 verses 19.06) displayed detoriation of their mood when offered the rewards. This coud be as the result of anxiety and nurvousness or becoming anxious to win the reward.

ALPHA is adjusted for subgroups in T test.

Bonferroni adjustment is made - ALPHA = 0.05 /2 = 0.025.

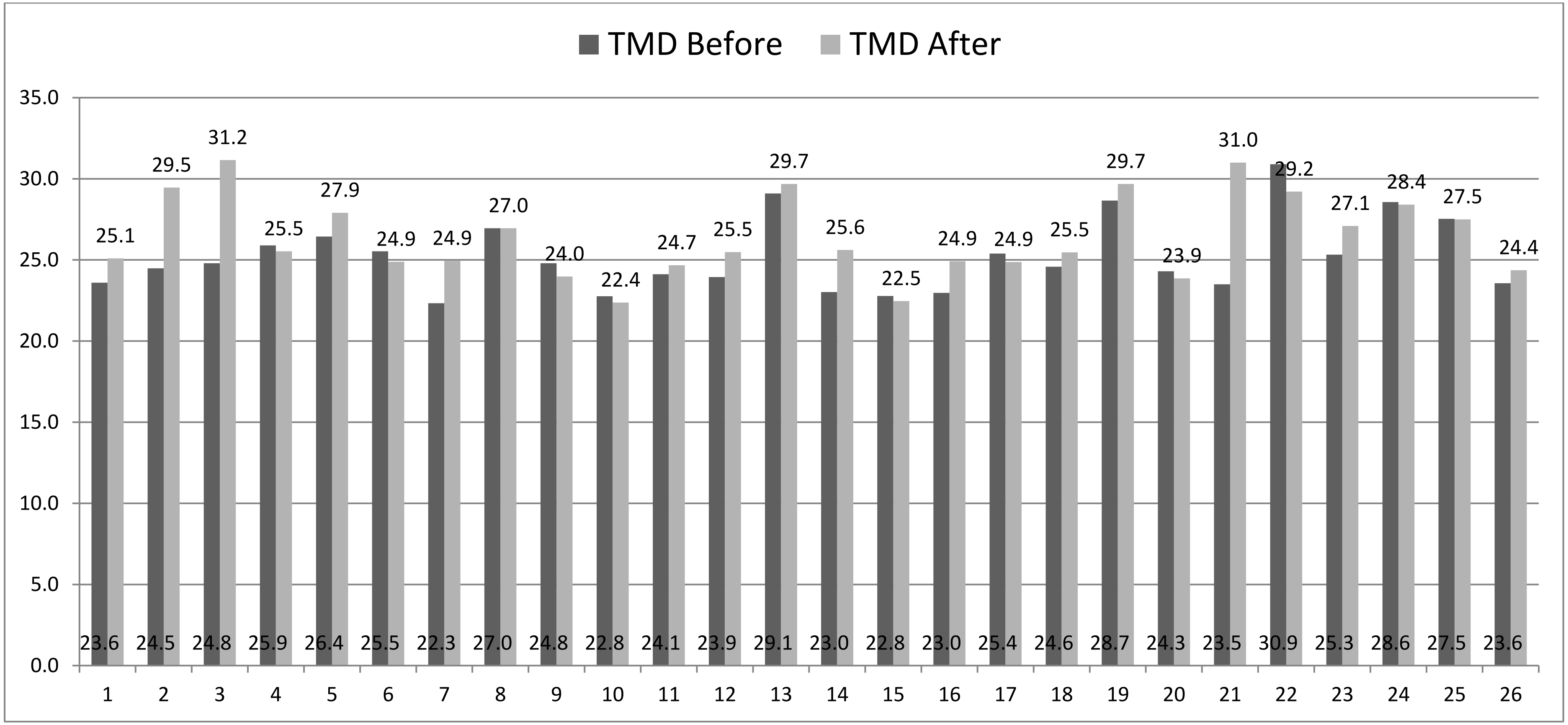
Student only	TMD Before	TMD After	Age
1	23.60	25.10	18
2	24.48	29.46	18
3	24.80	31.15	18
4	25.90	25.54	18
5	26.45	27.91	18
6	25.53	24.89	18
7	22.77	22.38	18
8	23.02	25.62	18
9	22.97	24.92	21
10	25.39	24.88	23
11	24.58	25.47	18
12	28.65	29.68	18
13	24.30	23.87	21
14	23.50	31.00	21
15	25.33	27.10	18
16	28.57	28.41	18
17	27.54	27.50	22
Mean	25.14	26.76	19.06
Variance	3.37	6.44	3.06
SD	1.83	2.54	1.75
Count			17

F-Test Two-Sample for Variances

	TMD Before	*TMD After*
Mean	25.14	26.76
Variance	3.37	6.44
Observations	17.00	17.00
df	16.00	16.00
F	0.52	
P(F<=f) one-tail	0.10	
F Critical one-tail	0.36	

t-Test: Two-Sample Assuming Unequal Variances

	TMD Before	*TMD After*
Mean	25.14	26.76
Variance	3.37	6.44
Observations	17.00	17.00
Hypothesized Mean Difference	0.00	
df	29.00	
t Stat	-2.13	
P(T<=t) one-tail	0.02	
t Critical one-tail	2.05	
P(T<=t) two-tail	0.04	
t Critical two-tail	2.36	


TMD Before
TMD After
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
25.1 29.5 31.2 25.5 27.9 24.9 24.9 27.0 24.0 22.4 24.7 25.5 29.7 25.6 22.5 24.9 24.9 25.5 29.7 23.9 31.0 29.2 27.1 28.4 27.5 24.4
23.6 24.5 24.8 25.9 26.4 25.5 22.3 27.0 24.8 22.8 24.1 23.9 29.1 23.0 22.8 23.0 25.4 24.6 28.7 24.3 23.5 30.9 25.3 28.6 27.5 23.6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

Staff / Student two sample (independent) t- test

Staff only	TMD Before	TMD After	Age
1	22.3	24.9	40
2	27.0	27.0	49
3	24.8	24.0	64
4	24.1	24.7	50
5	23.9	25.5	41
6	29.1	29.7	66
7	22.8	22.5	41
8	30.9	29.2	32
9	23.6	24.4	42
Mean	25.39	25.75	47.22
Variance	8.72	5.82	129.19
SD	2.95	2.41	11.37
Count			9

F-Test Two-Sample for Variances - Staff only

	TMD Before	*TMD After*
Mean	25.39	25.75
Variance	8.72	5.82
Observations	9.00	9.00
df	8.00	8.00
F	1.50	
P(F<=f) one-tail	0.29	
F Critical one-tail	4.43	

t-Test: Two-Sample Assuming Unequal Variances - Staff only

	TMD Before	*TMD After*
Mean	25.39	25.75
Variance	8.72	5.82
Observations	9.00	9.00
Hypothesized Mean Difference	0.00	
df	15.00	
t Stat	-0.28	
P(T<=t) one-tail	0.39	
t Critical one-tail	2.13	
P(T<=t) two-tail	0.78	
t Critical two-tail	2.49	

Descriptive Analysis - Staff only

TMD Before		*TMD After*	
Mean	25.39	Mean	25.75
Standard Error	0.98	Standard Error	0.80
Median	24.12	Median	24.94
Mode	#N/A	Mode	#N/A
Standard Deviation	2.95	Standard Deviation	2.41
Sample Variance	8.72	Sample Variance	5.82
Kurtosis	-0.14	Kurtosis	-0.50
Skewness	1.03	Skewness	0.67
Range	8.56	Range	7.22
Minimum	22.33	Minimum	22.47
Maximum	30.90	Maximum	29.68
Sum	228.55	Sum	231.76
Count	9.00	Count	9.00

Student only	TMD Before	TMD After	Age
1	23.60	25.10	18
2	24.48	29.46	18
3	24.80	31.15	18
4	25.90	25.54	18
5	26.45	27.91	18
6	25.53	24.89	18
7	22.77	22.38	18
8	23.02	25.62	18
9	22.97	24.92	21
10	25.39	24.88	23
11	24.58	25.47	18
12	28.65	29.68	18
13	24.30	23.87	21
14	23.50	31.00	21
15	25.33	27.10	18
16	28.57	28.41	18
17	27.54	27.50	22
Mean	25.14	26.76	19.06
Variance	3.37	6.44	3.06
SD	1.83	2.54	1.75
Count			17

F-Test Two-Sample for Variances - Students only

	TMD Before	*TMD After*
Mean	25.14	26.76
Variance	3.37	6.44
Observations	17.00	17.00
df	16.00	16.00
F	0.52	
P(F<=f) one-tail	0.10	
F Critical one-tail	0.36	

t-Test: Two-Sample Assuming Unequal Variances - Students only

	TMD Before	*TMD After*
Mean	25.14	26.76
Variance	3.37	6.44
Observations	17.00	17.00
Hypothesized Mean Difference	0.00	
df	29.00	
t Stat	-2.13	
P(T<=t) one-tail	0.02	
t Critical one-tail	2.05	
P(T<=t) two-tail	0.04	
t Critical two-tail	2.36	

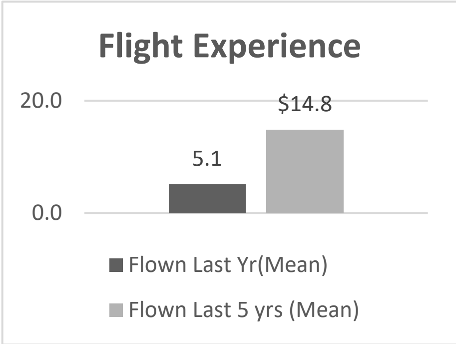
Descriptive Analysis - Students only

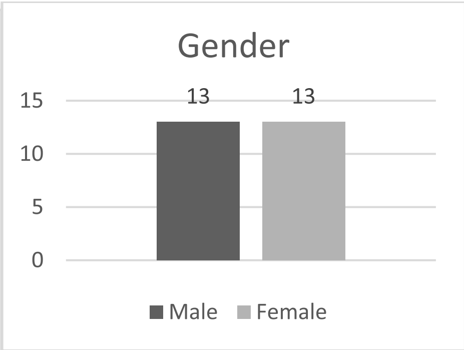
TMD Before		*TMD After*	
Mean	25.14	Mean	26.76
Standard Error	0.44	Standard Error	0.62
Median	24.80	Median	25.62
Mode	#N/A	Mode	#N/A
Standard Deviation	1.83	Standard Deviation	2.54
Sample Variance	3.37	Sample Variance	6.44
Kurtosis	-0.32	Kurtosis	-0.76
Skewness	0.66	Skewness	0.33
Range	5.89	Range	8.78
Minimum	22.77	Minimum	22.38
Maximum	28.65	Maximum	31.15
Sum	427.37	Sum	454.86
Count	17.00	Count	17.00

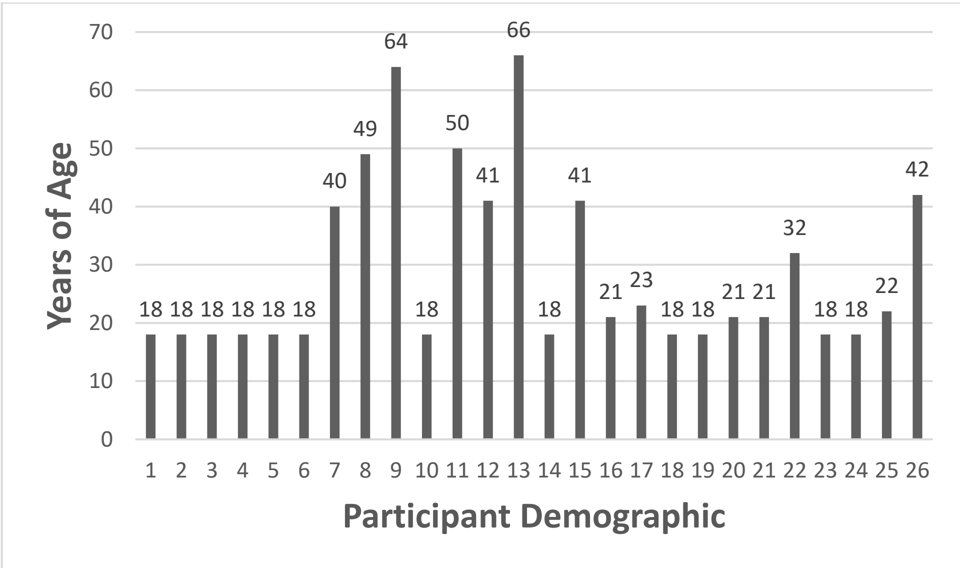
Demographics - Reward Group

Candidate	**Age**			Male
1	18	F	1	18
2	18	M	2	18
3	18	F	3	18
4	18	F	4	49
5	18	M	5	64
6	18	M	6	66
7	40	F	7	21
8	49	M	8	18
9	64	M	9	18
10	18	F	10	21
11	50	F	11	18
12	41	F	12	18
13	66	M	13	22
14	18	F	Average Age	28.38
15	41	F		
16	21	M		
17	23	F		
18	18	M		
19	18	M		
20	21	M		
21	21	F		
22	32	F		
23	18	M		
24	18	M		
25	22	M		
26	42	F		
Average Age	**28.81**			
Standard Dev	**15.17**			
Range (Min - Max)	**18**	**66**		
Male	**13**			
Female	**13**			

Demographics – Reward Group







Reward Group Recall Items

Reward Group	Items Remembered (%)	
1	47.0	Student
2	12.0	Student
3	38.0	Student
4	38.0	Student
5	62.0	Student
6	41.0	Student
7	41.0	Staff
8	59.0	Staff
9	56.0	Staff
10	74.0	Student
11	62.0	Staff
12	68.0	Staff
13	53.0	Staff
14	32.0	Student
15	47.0	Staff
16	9.0	Student
17	32.0	Student
18	12.0	Student
19	47.0	Student
20	6.0	Student
21	50.0	Student
22	29.0	Staff
23	12.0	Student
24	38.0	Student
25	9.0	Student
26	6.0	Staff
Mean	**37.7**	

	Items Remembered (%) - Staff
1	41.0
2	59.0
3	56.0
4	62.0
5	68.0
6	53.0
7	47.0
8	29.0
9	6.0
Mean	**46.8**

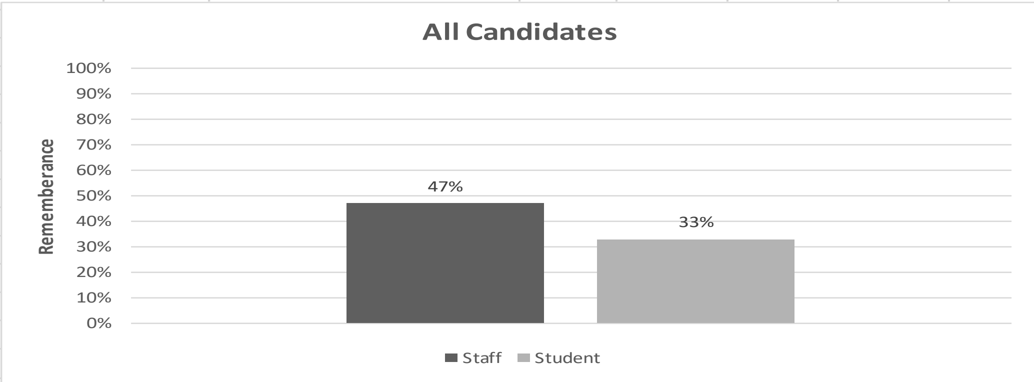
	Items Remembered (%) - Student
1	47.0
2	12.0
3	38.0
4	38.0
5	62.0
6	41.0
7	74.0
8	32.0
9	9.0
10	32.0
11	12.0
12	47.0
13	6.0
14	50.0
15	12.0
16	38.0
17	9.0
Mean	**32.9**

	Recall Items - Staff	Recal Items - Student
1	41%	47%
2	59%	12%
3	56%	38%
4	62%	38%
5	68%	62%
6	53%	41%
7	47%	74%
8	29%	32%
9	6%	9%
10		32%
11		12%
12		47%
13		6%
14		50%
15		12%
16		38%
17		9%
MEAN	**47%**	**33%**

Items Remembered (%) - Staff		*Items Remembered (%) - Student*	
Mean	46.78	Mean	32.88
Standard Error	6.42	Standard Error	4.91
Median	53.00	Median	38.00
Mode	#N/A	Mode	12.00
Standard Deviation	19.26	Standard Deviation	20.23
Sample Variance	370.94	Sample Variance	409.24
Kurtosis	1.57	Kurtosis	-0.67
Skewness	-1.30	Skewness	0.27
Range	62.00	Range	68.00
Minimum	6.00	Minimum	6.00
Maximum	68.00	Maximum	74.00
Sum	421.00	Sum	559.00
Count	9.00	Count	17.00

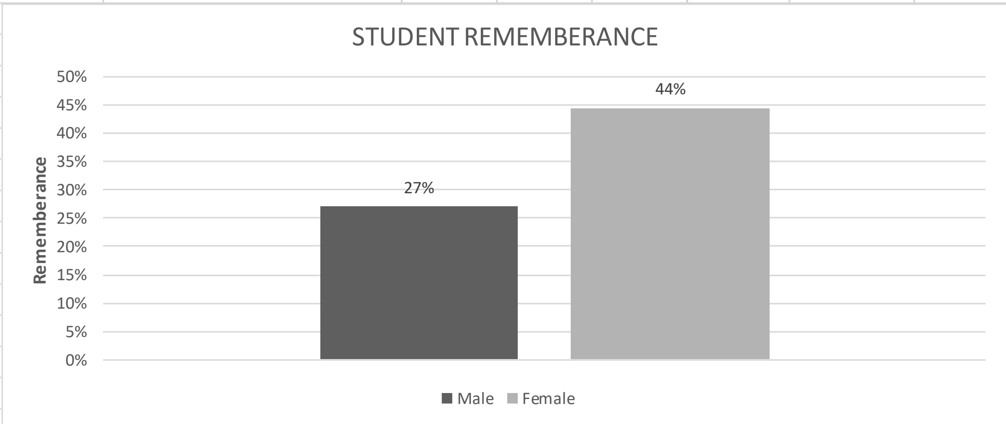
Reward Group Recall Items (%)– Staff/Student

	MEAN RECALL ITEMS
Staff	47%
Student	33%



Reward Group Recall Items (%) – Gender

	MEAN RECALL ITEMS
Male	27%
Female	44%

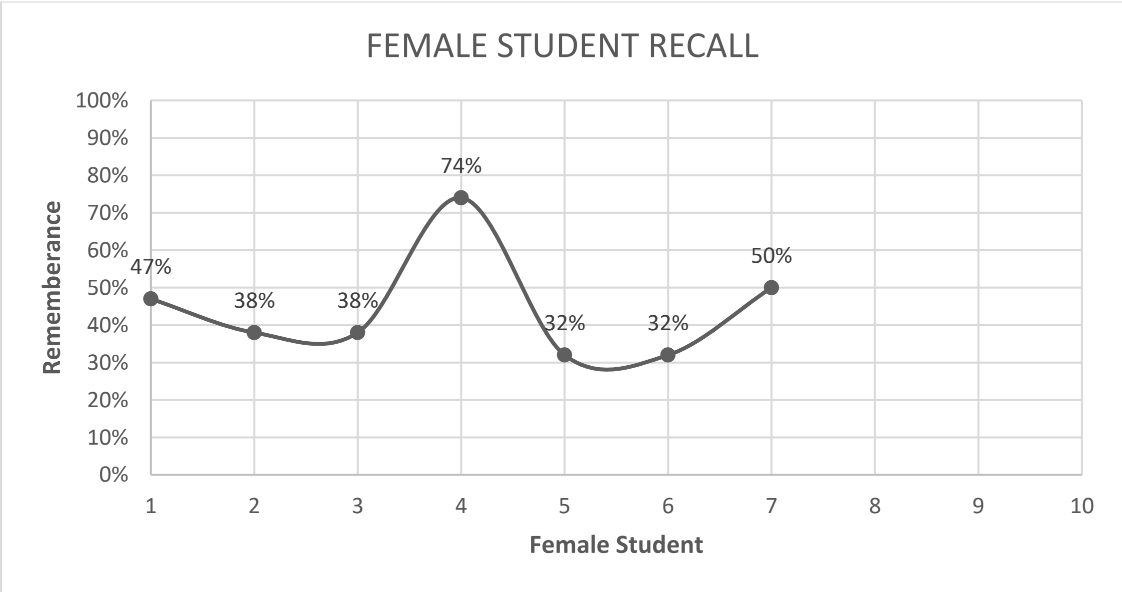


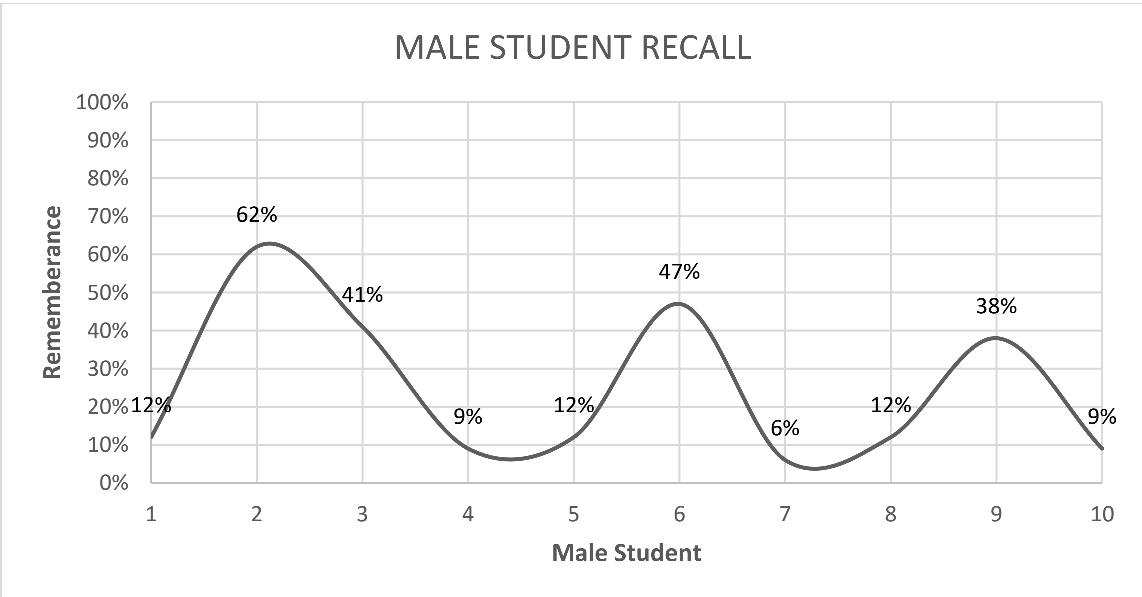
Reward Group Recall Items (%) – students by gender

Candidate	Recall Items - Student		
1	47%	F	Student
2	12%	M	Student
3	38%	F	Student
4	38%	F	Student
5	62%	M	Student
6	41%	M	Student
7	74%	F	Student
8	32%	F	Student
9	9%	M	Student
10	32%	F	Student
11	12%	M	Student
12	47%	M	Student
13	6%	M	Student
14	50%	F	Student
15	12%	M	Student
16	38%	M	Student
17	9%	M	Student

	STUDENT	RECALL
	FEMALE	MALE
1	47%	12%
2	38%	62%
3	38%	41%
4	74%	9%
5	32%	12%
6	32%	47%
7	50%	6%
8		12%
9		38%
10		9%
MEAN	**44%**	**27%**

Reward Group Recall Items (%) Graph– students by gender





Motivational Trait Questionnaire - MT

	Motivational Trait Questionnaire - MTQ			
	Candidate: XXX			
1	Normally, I feel motivated towards a behaviour when there is a reward.			
2	I don't engage in activities that are punishable.			
3	I always study hard because I want to get good marks.			
4	If I participate in a sport it is always because I want to win an award.			
5	If I compete in contest, it is to win a prize.			
6	If I participate in sport it is only because I enjoy it.			
7	If play a game it is because I find it exciting.			
8	I solve word puzzles because I find it challenging.			
9	I watch a pre-flight safety video enthusiastically to learn...			
10	I watch pre-flight safety videos because I follow rules.			
11	I watch pre-flight safety video because I am self-disciplined.			
12	I don't need to watch pre-flight safety videos because I have seen them...			
13	I would watch pre-flight safety videos if the airline stated I may win a prize.			

Reward Group MTQ Results - Table

Motivational Trait Questionnaire (MTQ) - Reward Group only

Question	1	2	3	4	5	6	7	8	9	10	11	12	13
Participant													
1	1	3	1	2	3	2	2	2	2	2	2	2	2
2	4	1	5	2	3	4	3	5	3	5	3	1	4
3	5	3	4	2	1	5	5	3	2	3	3	4	5
4	5	3	4	3	3	5	3	2	5	4	4	1	3
5	5	4	2	4	3	4	5	2	2	3	2	5	5
6	5	3	5	1	2	5	5	1	3	4	3	4	5
7	1	5	1	1	3	5	3	4	3	1	3	1	1
8	4	5	4	3	3	5	5	4	4	4	5	1	4
9	5	5	5	1	2	5	4	5	4	4	4	4	1
10	3	3	5	3	2	4	4	5	5	3	5	3	3
11	3	5	3	2	2	3	4	5	3	4	4	1	1
12	5	3	3	5	5	2	4	3	2	2	2	3	5
13	3	4	4	2	2	4	5	3	4	2	4	2	3
14	5	2	5	2	1	5	5	3	4	3	5	1	5
15	2	4	3	2	2	3	2	5	5	5	2	1	3
16	4	3	5	2	2	5	4	4	3	4	3	3	3
17	4	2	4	2	2	4	4	1	1	1	1	4	4
18	2	5	5	2	2	4	3	5	2	1	2	4	2
19	5	1	5	5	5	5	5	5	1	3	3	3	5
20	4	4	4	3	3	2	3	1	1	2	2	2	2
21	3	2	4	3	2	3	3	2	4	4	3	3	4
22	2	3	2	3	4	2	2	2	2	3	4	2	5
23	3	2	3	3	2	2	3	2	2	3	2	2	3
24	1	5	5	1	1	5	5	5	5	5	5	1	3
25	3	2	3	3	2	2	3	2	2	3	2	2	3
26	1	5	5	1	1	5	5	5	5	5	5	1	3

1 = completely disagree, 2 = somewhat disagree, 3 = neither agree or disagree, 4 = somewhat agree, 5 = completely agree

Appendix D: Published articles based on this thesis

Appendix D contains articles relating to Experiment 1 and 2 which were published in *Aviation Psychology and Applied Human Factors*, *Applied Ergonomics* and *Atlas of Science*.

Atlas of Science
another view on science
http://atlasofscience.org

Appendix 12

Does humour undervalue the importance of safety information contained in pre-flight safety briefings?

Most readers would agree they experience variations in mood from time to time. In some circumstances, the trigger or origins of this change in mood is difficult to determine. What research has revealed, is that mood is linked to performance. The performance of a person on a given task is more likely to be superior when that person is in a positive mood (happy), compared to when he/she is in a negative mood (sad). For athletes, this edge may be enough to secure victory in their sporting arena. For retail businesses, this may translate into increased sales. What is less clear however, is the implications of this relationship from a safety perspective.

Take passenger safety onboard aircraft for example. Prior to every flight, passengers are provided with information about the safety features of the aircraft they are onboard. This is provided in the form of a pre-flight safety briefing. Passengers are expected to recall and apply this information in the event of an emergency. Presumably, if they were in a positive mood prior to the emergency, their recall of the safety information as well as their performance in the emergency would be superior to if they were in a negative mood. However, there are limitations to the extent to which mood manipulations last. Considering most aircraft accidents occur in either the departure phase (i.e., take-off) or the landing phase of flight, manipulating mood prior to these phases of flight may have important safety outcomes. In contrast to this expectation, we found when we manipulated the mood of our research participants using a humorous pre-flight safety briefing, their ability to recall key safety messages presented in the briefing declined. Mood was measured using a well established scale called the Profile of Mood States Questionnaire Short Form. Participants exposed to what most commercial passengers would call a standard briefing, one that is void of humour, recalled on average 47% more key safety messages than participants exposed to the humorous briefing. These results suggest that there is a trade-off between entertainment and education; the greater the entertainment value, the poorer the retention of key safety messages.

While this result does not reflect favourably on the use of humour in safety briefings, in terms of information recall, there may be other benefits to using humour in these briefings that were not measured in our study. As we all know, despite the important safety information presented in preflight safety briefings, the manner in which the information is presented can make it difficult at times, to remain attentive. Hence, it is possible by presenting information in a humorous manner, it encourages individuals to watch or maintain watching these briefings. Humour may also improve behaviour in an emergency evacuation, namely reducing egress time during the evacuation.

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Publication

Pre-flight safety briefings, mood and information retention.
Tehrani M, Molesworth BR

Original Article

The Effect of Mood on Performance in a Nonnormal Situation

Unscheduled Aircraft Evacuation

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Abstract: The effect of mood on performance in everyday situations is widely studied and the results commonly reveal a mood-congruence relationship. However, little is known about the effect of mood on performance in nonnormal situations such as those experienced during an unscheduled event. This study investigated whether induced mood (positive or negative) influenced performance during an unscheduled aircraft evacuation. Forty-five participants (15 female), with an average age of 21.90 (*SD* = 3.96) years, were randomly exposed to either positive or negative mood facilitation. Following this, all participants watched the same preflight safety video, and then had to conduct an unscheduled evacuation following a simulated water ditching. Participants exposed to a positive mood manipulator were found to commit fewer errors during the evacuation exercise and completed the evacuation in less than half of the time taken by participants who were exposed to a negative mood manipulator. In safety-critical environments such as aviation, these results highlight the advantages of creating an atmosphere or environment that induces positive moods.

Keywords: mood, performance, nonnormal situation, aviation, cabin safety

The effect of mood on performance is well documented. Pleasant/positive moods such as happiness or elation have been shown to improve intellectual performance (i.e., verbal and quantitative ability; Albarracin & Hart, 2011), task interest (Hirt, Melton, McDonald, & Harackiewicz, 1996), self-perceived creativity (Montgomery, Hodges, & Kaufman, 2004), teamwork (Barsade, 2002), decision-making (Barsade & Gibson, 2007), and life meaningfulness (King, Hicks, Krull, & Del Gaiso, 2006). Within teams, pleasant moods (i.e., happy) have been shown to improve communication skills such as anticipatory communication patterns and detail of verbal responses (Pfaff, 2012). Happy people are also less sensitive to threats within their work environment, less defensive or cautious with their colleagues, and are more optimistic and confident (Cropanzano & Wright, 2001). By contrast, unpleasant/negative moods such as sadness or sorrow have been shown to adversely affect: decision-making in terms of quantity of food eaten (Tice, Bratslavsky, & Baumeister, 2001); affective states, information processing, and task performance (Friedman, Forster, & Denzler, 2007); success and motivation of female rowers (Raglin, Morgan, & Luchsinger, 1990); and team processes, including team performance (Jordan, Lawrence, & Troth, 2006). However, the relationship between mood and performance is not always in a mood-congruence direction. For example, Lount (2010) found that while a pleasant mood helped improve trust between group members, it harmed trust in intergroup interactions. These results are consistent with intergroup diversity behavior in the presence of mass panic. Moreover, Drury and colleagues (2009) propose that in the presence of a crowd and a panic situation, individuals offset the risk of death and injury from helping their own group members by reducing cooperative behavior. This in turn increases competition for an emergency escape (Drury et al., 2009). Forgas (1991) also found that a negative mood such as dysphoria motivated individuals to perform, and facilitated in self-servicing interpersonal choices as well as improved the memory for specific events.

Mood and emotions are closely linked. Emotions are defined as an affective state (i.e., feeling) that is orientated toward a specific event such as a gift or award and are experienced for a short period of time (i.e., ranging from seconds to hours; Newton, 2013). Mood similarly is defined as an affective state (i.e., feeling); however, this state lasts for an extended period of time, often counted in days, and is attributable to circumstances, such as pressure at work, as opposed to a single object or event (Russell, 2003). Examples of positive affective states are joy,

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contentment, and relief. Examples of negative affective states are anger, fear, disgust, and shame (Eznack, 2013).

Researchers investigating the relationship between mood and performance commonly focus on everyday situations; situations that could be described as routine and/or non-life threatening. For example, Jordan, Lawrence, and Troth (2006) found that in a teamwork situation, negative mood reduced team performance in terms of team cohesion and decision-making. Negative mood in this case was measured by using a 10-item structured mood scale (attitude, interested, alert, excited, enthusiastic, inspired, proud, determined, strong, and active) called Positive and Negative Affect Schedule (PANAS), developed by Watson, Clark, and Tellegen (1988). Zohar (1999) also found that in the daily life of military jump masters, their mood was related to the daily hassles they faced, as well as fatigue and self-reported workload. Zohar employed a combination of scales to assess participants' mood. For negative mood assessement he used the PANAS scale, while for fatigue he used the fatigue scale in McNair and colleagues' Profile of Mood State (POMS) questionnaire (encompasses six factors: Depression, Vigor, Anger, Tension, Confusion, and Fatigue; McNair, Lorr, & Droppleman, 1971). Hence, what remains unknown, and is the central aim of the present research, is how mood state affects performance in situations that are not commonly experienced.

Take, for example, an emergency evacuation of an aircraft. Flying remains the safest mode of transportation (Savage, 2012). According to Savage, an individual is 48 times more likely to be fatally injured in a motor vehicle accident than in a commercial aircraft accident. Despite these statistical data, prior to every flight passengers are briefed about the safety features of the aircraft they boarded, and told how to respond in the unlikely event of an emergency. The aim of the present research is to examine the effect of mood on performance during an unscheduled emergency aircraft evacuation (i.e., nonnormal situation).

Mood takes the form of a moderating factor, thereby influencing behavior. For optimum performance, moderating factors need to act in the positive, hence enhancing rather than hindering performance. Parker, Reason, Manstead, and Stradling (1995) found precisely this when they surveyed 1,600 drivers in an attempt to better understand the reasons behind abnormal driving habits (i.e., lapses, errors, and violations). The results revealed that the best predictors of scores on the error factor were related to the susceptibility of driving to mood. Respondents who reported their driving was affected by their mood also reported more lapses and rated themselves as more error-prone than those with fewer driving lapses. Similar results have been found with tasks such as proofreading where participants in a negative mood state commit more errors than their more neutral or happier colleagues (Ellis, Ottaway, Varner, Becker, & Moore, 1997).

In time-critical or high-hazard situations, such as a rapid disembarkation during an unscheduled (i.e., emergency) evacuation of an aircraft, counterproductive behavior has the potential to cause serious consequences. This is precisely what occurred during an emergency evacuation of a Boeing 737 at Manchester International Airport in 1985, resulting in the loss of 55 lives. During the evacuation, which was initiated in response to an engine fire, passengers' behavior varied from chaotic and disorderly (i.e., climbing over seats), to erroneous (i.e., lack of knowledge on how to operate over wing exit; no formal instructions provided), ultimately causing congestion at two exit points and subsequently their blockage, exposing passengers to deadly smoke and toxic fumes (Air Accidents Investigation Branch, 1988).

In order to prevent precisely these types of incidents, aviation authorities around the world such as the American Federal Aviation Administration and the Australian Civil Aviation Safety Authority require all passengers to be briefed about the safety features of the aircraft they are on board prior to every flight, and for all new aircraft introduced into an airline's fleet it must be demonstrated that all passengers can be evacuated within 90 s using only half of the available emergency exits (Federal Aviation Regulations [FARS], 14 CFR 23.803; Civil Aviation Order [CAO] 20.11). However, as Muir, Bottomley, and Marrison (1996) have illustrated, expedient egress from an aircraft relies not only on the availability of exits, but also on how passengers behave in such circumstances. In fact, they found the most effective method to induce a serious blockage at an exit point was to provide financial incentives in the form of a bonus payment for the first 50% of volunteers to evacuate the aircraft, suggesting motivation plays a leading role in shaping passenger behavior in an aircraft emergency. Whether mood affects behavior under similar conditions remains unknown.

Mood can be manipulated in a variety of ways. For example, Samuels and other authors found that colors can affect mood (Samuels, 1999; Stone & English, 1998). Moreover, in a study with 112 university students, they simply manipulated the color of the partitions between the work stations, and found that following a basic computer task, students who were exposed to the blue partition perceived the temperature to be cooler than those who were exposed to red partitions. The same students also felt calmer, and perceived their privacy to be higher than the students with the red partitions (Stone & English, 1998). Similarly music has also been found to affect mood, which in turn can impact on behavior (Moon, Kim, Lee, & Kim, 2014; Zwaag et al., 2012). Moreover, Krumhansl (1997) found that rapid dance-type rhythm music had a positive effect on mood (i.e., happy), while music with a slow tempo and constant pitch adversely affected mood (i.e., sad). Richards and Whittaker (1990) used pictures as a method to affect mood. Simply by exposing participants to three images, such as images depicting peace or beauty (e.g., baby and two scenic views) or images depicting death or destruction (e.g., severed head, scared face, and football hooligans), and asking them to critique the images, they were able to manipulate mood (images of peace and beauty instilled a positive mood, whereas images of death and destruction instilled a negative mood).

The present study extended the research in the area of mood and performance, and investigated whether mood could be used to manipulate performance in a nonnormal situation, namely, an unscheduled aircraft evacuation. It was hypothesized that participants in the positive mood manipulation condition would commit fewer errors and complete the evacuation quicker than participants in the negative mood manipulation condition.

Method

Design Overview

The research was conducted in two stages. The first stage tested the efficacy of the mood manipulator, while the second stage tested the effect of the mood manipulator in situ, namely, its effect on performance during an unscheduled evacuation of an aircraft. While both stages could have been incorporated into one experimental sequence, it would have required the measurement of mood three times, as opposed to two; the third time would be part way through the experimental sequence, thereby disrupting the natural flow of events during the unscheduled aircraft evacuation, hence jeopardizing the applied objective (i.e., ecological validity) of the research.

Stage 1

Participants

Fourteen students and university staff (eight female), with an average age of 33 (SD = 14.33) years, participated in Stage 1 of the research. No reimbursement was provided and the average time to complete this stage was 5 min. The research, including the stimuli for both stages of the study (i.e., mood manipulation and unscheduled aircraft evacuation exercise), was approved in advance by the University of New South Wales ethics panel.

Material

The material consisted of: an information sheet, consent form, demographics questionnaire (i.e., age, gender), six photographs (three unpleasant and three pleasant images) serving as the mood manipulators, a photograph rating sheet, and a mood measurement scale (Profile of Mood State-Short form; POMS-SF).

Mood Manipulation

The mood manipulating stimulus was consistent with that used by Richards and Whittaker (1990), and contained three unpleasant images (e.g., depicting scenes of violence) and three pleasant images (e.g., depicting scenes of flowers) along with a photograph rating sheet, namely, three questions designed to ensure the participants were engaged in the photographs (e.g., photographs pleasant or unpleasant, attracted their attention, saw professionalism in each photograph). Participants' responses on the photograph rating sheet were reviewed as opposed to scored, owing to the subjective nature of the questions as well as the objective of the exercise (focus was on engagement and reflection on the images).

Mood Measurement

Participants' mood was measured using a shortened version of the POMS survey (i.e., POMS-SF; Terry, Lane & Fogarty 2003). The long form of the POMS survey (original survey) has been extensively used in a variety of settings including: hospitals, universities, and outcare patient facilities (Curran, Andrykowski, & Studts, 1995; Shacham, 1983; Terry et al., 2003; Zohar, 1999). In contrast to the long version that has 65 items covering six factors (e.g., tension–anxiety, depression–dejection, anger–hostility, fatigue–inertia, vigor–activity, and confusion–bewilderment) the short version has only 37 items with the same number of factors; however, it can be administered in approximately half the time without compromising the scale (Shacham, 1983). Shacham (1983) also investigated the validity of the new shorter scale through the conduct of a series of correlational analyses between each factor on the long scale and the short scale, which revealed a very high correlation (each factor above r = .95).

Procedure

Participants were recruited from the University of New South Wales. They were provided with an information sheet and a consent form. Following this, participants were randomly assigned to one of two groups (negative or positive mood manipulation group) and asked to complete the 37-item POMS-SF questionnaire. Depending on which group they were randomly assigned, they were provided with either three unpleasant or three pleasant photographs and asked to concentrate on each photograph for 30 s and rate them by completing the photograph rating form. After they had completed the photograph rating form, a second POMS questionnaire was administered as a final step of the study. The total time taken to complete Stage 1 was approximately 5 min.

Results

In order to determine whether the two mood manipulators were effective, mood scores prior to the mood manipulator were compared with mood scores following the mood manipulator for each experimental condition (positive vs. negative mood manipulation). However, before this, it was important to ensure that each participant evaluated the photographs as asked. This was achieved by reviewing the material written by each participant on the photograph rating sheet to ensure that they looked at and thought about the pictures presented. All participants wrote meaningful comments, and as a result no participant was excluded. Mood was calculated based on Shacham's (1983) Total Mood Disturbance (TMD) scores for the POMS-SF using the formula:

$$\begin{aligned} &\text{Depression} - \text{Dejection} + \text{Tension} - \text{Anxiety} + \text{Anger} \\ &\quad - \text{Hostility} + \text{Fatigue} - \text{Inertia} + \text{Confusion} \\ &\quad - \text{Bewilderment} + (24 - \text{Vigor} - \text{Activity}). \end{aligned}$$

Owing to the relatively small sample size, a nonparametric test was employed, that is, a Wilcoxon signed-rank test. The results revealed that both mood manipulators were effective in positively influencing participants' mood in the desired direction. Specifically, TMD scores in the positive mood manipulation group decreased from 24.47 to 22.76 – lower scores on TMD equals more positive mood; $z\ (N = 6) = 2.20$, $p = .028$. Similarly, TMD scores in the negative mood manipulation group increased from 21.77 to 22.67 – higher score on TMD equals more negative mood; $z\ (N = 8) = 1.96$, $p = .050$. This result indicates that the mood manipulators were effective in influencing participants' mood in the desired direction.

Stage 2

Having established the efficacy of both the positive and negative mood manipulators, the next step was to test the effect of these mood manipulators on participants' performance during an unscheduled evacuation of an aircraft; hence Stage 2 of the present study.

Participants

Forty-five university students (15 female), with an average age of 21.90 ($SD = 3.96$), years completed the research. On average, participants had flown three single-leg sectors in the past 12 months and nine single-leg sectors in the past 5 years. No participant had reported being involved in an in-flight emergency[1]. All participants were reimbursed with a $10 bookshop gift voucher for their time. As noted in Stage 1, the research was approved in advance by the University of New South Wales ethics panel.

Design

The research was designed to examine the effect of mood on performance during a nonnormal situation. Two independent variables featured; one repeated measures factor and one between-groups factor. The repeated measures factor Evacuation contained two levels (before vs. after), likewise did the between-groups factor Mood (negative vs. positive). Two dependent variables were employed, namely, number of errors during the nonnormal and unscheduled evacuation, and time taken to egress the aircraft. For all statistical procedures, α was set at .05.

Material

The documentations consisted of: an information sheet, consent form, demographics questionnaire (i.e., age, gender), Macquarie dictionary and thesaurus, flight status information sheet (i.e., description about the flight), and photograph rating sheet (consistent with Stage 1). In addition, a Panasonic DMC-FS20 video camera and tripod (to record the evacuation event) was used to record participants.

Aircraft Cabin

A mock aircraft cabin, reflecting a Boeing 737-800 single-aisle configuration, was constructed within the research facilities on campus. The aircraft set-up comprised 15 seats with five rows, using molded high-back plastic seats, one of which was modified as to be akin to an aircraft seat by fixing a seat belt and compartment below the seat to store a life jacket. The aircraft cabin also contained one over-wing emergency exit (type III) and one door (also used as an emergency exit during flight). All of the 15 seats and nominated emergency exits were set up on the port side of the passenger cabin. Seat pitch for the passenger rows was set according to the actual aircraft dimensions at 80 cm and

[1] Owing to technical issues, data pertaining to flight frequency and in-flight emergency were lost. As a result, these questions were re-administered at the time of writing this manuscript and not all students who originally completed the research could be contacted (31 out 45 re-answered these questions).

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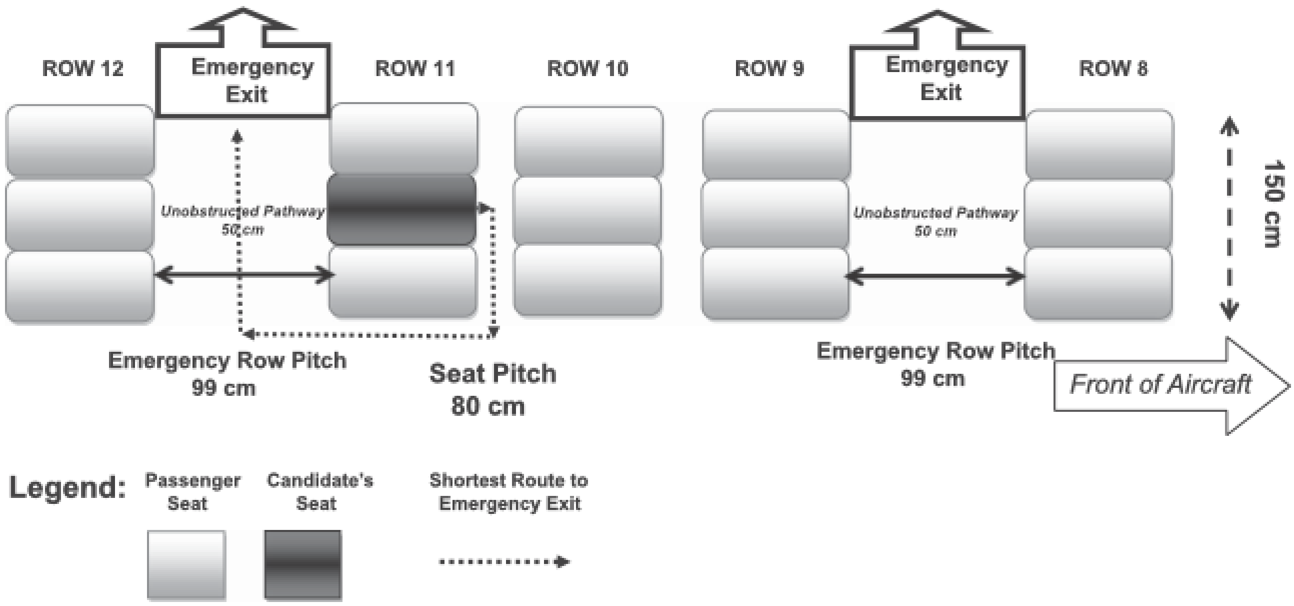

Figure 1. Experimental design layout of cabin.

for the emergency exit row at 99 cm (slightly wider) in accordance with the United States Federal Aviation Regulations (FAA FARS, 14 CFR 25.813, 2000). Identical seat spacing (pitch) was employed to reflect as close as possible that present in commercial aircraft.

The focus of the present research was on the economy class (see Figure 1), with two emergency exits. One emergency exit was located immediately behind the participant's seat, as an over-wing exit, and the second exit was located two rows in front of the participant. Hence, the strategic placement of the emergency exits provided participants with a choice of exits to use. The emergency exit features, in terms of size and signage were a direct replication of those present on aircraft. All emergency exits were marked with EXIT signs. Other materials for the study included one aviation life jacket (permission granted from airline to use the aviation life jacket), and a pre-take-off safety briefing video (4 min 30 s). The same mood manipulator (photographs) and measurement (POMS questionnaire) were employed as in Stage 1.

Procedure

Participants were recruited from the student population (undergraduate and postgraduate) of a university. The method entailed only one participant completing the study at any time. All participants were informed that the study was concerned with examining the effects of mood on performance in an aviation setting. They were briefed both verbally and through the information sheet that they would be asked to participate in an unscheduled evacuation of an aircraft cabin. However, they were not informed when this event would occur.

Each participant was randomly assigned to one of two groups (unpleasant or pleasant image group) and asked to read an information sheet and sign a consent form. Participants were then asked to complete the 37-item POMS-SF questionnaire. Following this, and depending on which group they were randomly assigned to, each participant was provided with either three unpleasant or three pleasant photographs and asked to concentrate on each photograph and rate them by completing the photograph rating form. After they had completed the photograph rating form, the simulated flight commenced by directing the participant to a nominated seat, asking them to read the flight status information sheet (informed participant that they were about to take a flight on an aircraft departing from Sydney, Australia, for Melbourne, Australia, with a planned track over water), and having them watch the pre-take-off safety briefing video. The safety briefing video reminded the participant/passenger about the procedures regarding an overwater emergency, the location of the life jackets, and how to use the life jacket in case of an emergency. All participants were provided carry-on luggage, in the form of a backpack. The preflight safety video mentioned putting all personal items either in the overhead compartment or below the seat in front. As there was no overhead storage in the mock aircraft cabin, participants placed their belongings under the seat in front.

The facilitator moved to his seat and waited for 30 s, simulating the take-off roll. After take-off, the facilitator stood up and started to yell, "Ladies and gentlemen, we have an emergency. We have ditched, we have to evacuate the aircraft immediately," and subsequently shouted, "Evacuate, evacuate, evacuate, high heels off!" three times.

The correct response for the candidate should have been: pull the life jacket out from the seat and place it on, buckle the straps according to the pre-take-off safety video, and approach the nearest exit. The entire exercise from the beginning of take-off until approaching the exit was recorded to determine the exact time taken and the number of errors committed during the procedure. Following the unscheduled evacuation, participants were required to complete a second POMS-SF questionnaire. Finally, the participants were thanked for their contribution and presented each with a $10 bookshop gift voucher. The total time each participant took to complete the experiment was approximately 30 min.

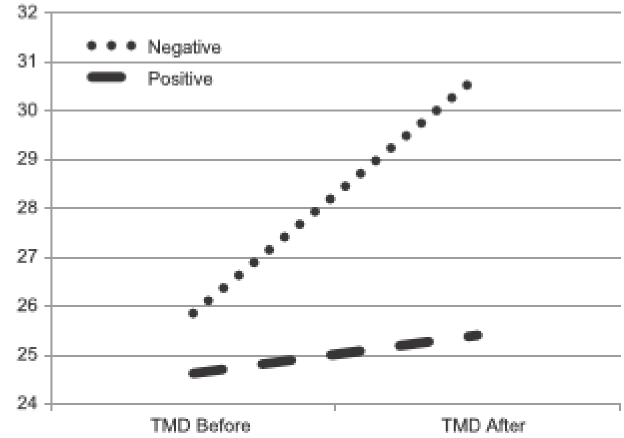

Figure 2. Participants' TMD score distributed across mood group, before and after the mood manipulation. TMD = Total Mood Disturbance.

Results

Since the main aim of the present research was to examine the effect of mood on performance in nonnormal situations, it was important to establish that the random allocation of participants to each group was successful, as well as the effectiveness of the mood manipulators. As a result, a mixed repeated measures ANOVA was conducted with Evacuation (before vs. after) as the repeated measures factor and Mood (negative vs. positive) as the between-groups factor. Consistent with Stage 1, TMD score featured as the dependent variable. With the ANOVA test assumptions satisfactory, the results revealed a main effect for Evacuation, $F(1, 43) = 43.29$, $p < .001$, an interaction between Evacuation and Mood, $F(1, 43) = 22.64$, $p < .001$, as well as a between-groups effect for Mood, $F(1, 43) = 15.64$, $p < .001$.

The main effect (repeated measures) for evacuation indicates that mood changed as a result of the mood manipulation (TMD prior = 25.26 [SD = 2.53] and TMD post = 28.13 [SD = 4.51]; lower scores of TMD equals more positive mood), while the between-groups main effect relating to Mood indicates that overall the negative mood group obtained a higher TMD score compared with the positive mood group. It should be noted that a lower TMD score equals a more positive mood. In terms of the Evacuation × Mood interaction, a series of simple effects analyses were conducted in order to determine where the significance lay. As can be seen in Figure 2, TMD scores prior to the mood manipulation in the negative mood group (25.86, SD = 2.74) were similar to the TMD score of the participants in the positive mood group (24.63, SD = 2.18), as determined by an independent samples t test with α adjusted to .025 (Bonferroni adjustment .05/2) to control for the repeated use of the dependent variable; $t(43) = 1.66$, $p = .052$. This result suggests that the random allocation of participants to each group was successful. By contrast, a statistically significant difference was present between the TMD scores after mood manipulation between the negative mood group (30.73, SD = 4.27) and the positive mood group (25.41, SD = 2.89), $t(43) = 4.97$, $p < .001$. This result suggests that the mood manipulation was effective wherein participants in the negative mood group had a higher TMD score than participants in the positive mood group.

No statistically significant difference was evident between TMD scores for the positive mood group before (24.63, SD = 2.18) and after the mood manipulator (25.41, SD = 2.89) as determined by a dependent samples t test with α set at .025; $t(22) = 2.19$, $p = .04$. However, a statistically significant difference was evident between TMD scores for the negative mood group before (25.86, SD = 2.74) and after the mood manipulator (30.73, SD = 4.27) as determined by a dependent samples t test with α set at .025; $t(22) = 6.35$, $p < .001$. This result indicates that the mood manipulation was most effective in adversely affecting participants in the negative mood group, and importantly it was in the intended direction (adversely affected mood).

Table 1 provides a detailed breakdown for each factor comprising the POMS-SF scale, including the TMD score. As can be seen from this table, mood scores increased on each of the six factors after mood manipulation for participants in the negative mood group. By contrast, scores on four of the six factors largely remained unchanged for participants in the positive mood group, after mood manipulation. The two factors that changed, namely, Tension and Confusion, increased. Given the nature of the experiment, that is, completing an unscheduled evacuation of an aircraft (nonnormal exercise) following the manipulation of mood, these results are hardly surprising. What remains unknown, however, is the extent to which these changes can be

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Table 1. Mood state before and after exposure to mood manipulation, including standard deviation and effect size for each experimental group

	Positive			Negative		
Mood state	Before (*SD*)	After (*SD*)	Effect Size	Before (*SD*)	After (*SD*)	Effect Size
Depression	0.27 (0.50)	0.32 (0.61)	0.09	0.32 (0.43)	1.10 (0.96)	1.19
Vigor	1.52 (0.97)	1.52 (0.99)	0.00	1.36 (0.82)	1.37 (0.75)	0.01
Anger	0.23 (0.42)	0.24 (0.49)	0.02	0.28 (0.40)	1.12 (0.99)	1.17
Tension	0.46 (0.48)	0.87 (0.78)	0.82	1.03 (0.65)	1.73 (0.96)	0.87
Confusion	0.41 (0.40)	0.71 (0.66)	0.57	0.81 (0.67)	2.53 (1.16)	1.88
Fatigue	0.77 (0.73)	0.69 (0.72)	0.11	0.86 (0.63)	1.62 (1.09)	0.79
TMD	24.63 (2.16)	25.41 (2.69)	0.31	25.88 (2.74)	30.73 (4.27)	1.39

Notes. Total Mood Disturbance (TMD) score calculated using the formula Depression–Dejection + Tension–Anxiety + Anger–Hostility + Fatigue–Inertia + Confusion–Bewilderment + (24 − Vigor–Activity). Effect size calculated using Cohen's *d*.

Figure 3. Error checklist employed to assess participant performance during simulated evacuation exercise

Did the participant:			
1.	Forget the life jacket and was to evacuate the aircraft without it?	Yes ☐	No ☐
2.	Know the location of the life jacket – i.e., able to find it?	Yes ☐	No ☐
3.	Pull out the life jacket?	Yes ☐	No ☐
4.	Put on the life jacket correctly – placing the rounded side of the jacket behind the head and the squared side in front?	Yes ☐	No ☐
5.	Tie the strap properly – putting the strap around the waist circumference?	Yes ☐	No ☐
6.	Attempt to inflate the life jacket prior to exiting the aircraft?	Yes ☐	No ☐
7.	Attempt to carry any personal items during the evacuation – i.e., bags, laptop computer, etc.?	Yes ☐	No ☐
8.	Choose the nearest emergency exit?	Yes ☐	No ☐
9.	Have any mishap during evacuation – i.e., tripped, slipped, lost balance?	Yes ☐	No ☐
10.	Ask any questions regarding Steps 1–9 after commencing evacuation – "Evacuate, evacuate, evacuate"?	Yes ☐	No ☐

Note. The entire process from the commencement of evacuation until completion took __________ seconds.

attributed to the unscheduled evacuation or the mood manipulation, a point that is elaborated on in the discussion section.

Having established that the mood manipulation was effective, the next step of the analysis involved examining performance between the two experimental groups. Performance could be measured in two ways, the first involving total time to complete the evacuation exercise and the second involving number of errors committed during the evacuation. In terms of the latter, an error checklist was created through a task decomposition method (Stanton, Salmon, Walker, Baber, & Jenkins, 2005), based on the information contained in the preflight safety briefing. It should be recalled that the purpose of the preflight safety briefing is to inform/educate passengers on how to behave in the unlikely event of an emergency. In doing so, it allows the flight attendants to perform other critical roles to facilitate in the safety of all passengers. Some of these roles include: identify which emergency door/s have to remain closed (owing to the wind or fire), deploy and secure slides, inflate the life raft (during ditching), facilitate in the quick disembarkation (less than 90 s), and assist people who are not mobile or carry small children. In total, a maximum of 10 possible errors were identified.

Figure 3 outlines these errors and as can be seen from this table, the errors largely focus on identifying and using the life jacket appropriately. A behavior that was counter to exiting the aircraft in the shortest possible time was also encountered as an error. Therefore, behaviors such as failing to choose the closest exit, experiencing a mishap while evacuating (i.e., tripping), or asking for instructions were also classified as an error. As can be seen in Figure 4, only three participants (all from the negative mood manipulation group) committed an error classified under point nine of the error checklist (e.g., mishap during evacuation, specifically all lost balance), while two participants in the negative mood manipulation group committed an error each classified under point ten, namely, asking which exit they should evacuate from ($n = 1$ participant) and how they should fit on their life jacket ($n = 1$ participant). However, a total of six participants (three from each group) failed to remove their life jacket from beneath the seat, and hence approached the exit without a life jacket. Since the simulated emergency involved ditching over water, the participants who failed to remove their life jacket from their seat were reminded of this and subsequently went back to collect their jacket – a procedure that is common practice on commercial aircraft where no other flotation devices (i.e., life raft or floating emergency slide) are on board (as advised by a cabin safety manager with 30 years' flying experience).

With the assumptions of normality and homogeneity of variance met, the results of the independent t test indicated

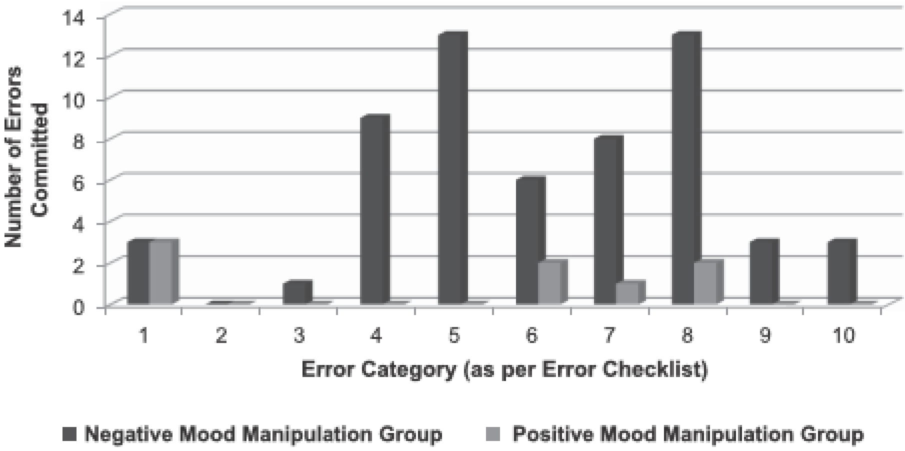

Figure 4. Total number of errors committed per mood manipulation group distributed across error category as per error checklist.

a statistically significant difference between participants in the positive mood manipulation group and participants in the negative mood manipulation group in terms of time taken to complete the emergency evacuation, t (43) = 3.64, p = .0005. The total time taken to complete the evacuation for participants in the positive mood group was 37.50 s (SD = 19.63 s), while participants in the negative mood group took almost twice as long (66.09 s, SD = 31.41 s).

The second analysis compared performance based on the number of errors between the two experimental groups. Using the t test for unequal variances because of violation of the assumption of homogeneity of variance, a statistically significant difference was found between the positive mood manipulation group and the negative mood manipulation group, in terms of number of errors committed, t (43) = 5.62, $p < .001$. Participants in the positive mood manipulation group committed on average less than one error per exercise (.36 errors, SD = 0.66) while participants in the negative mood manipulation group committed approximately seven times as many errors during the same exercise (2.57 errors, SD = 1.75).

In order to examine whether prior exposure to preflight safety briefings affected participants' performance in terms of number of errors or egress time (dependent variables), a series of correlational analyses were conducted between these two variables and the number of flights participants had flown in the previous 12 months and 5 years. The results of the correlational analysis failed to reveal any relationships, largest r, r(31) = .224, p = .226.

Discussion

The effect of mood on performance in normal situations/conditions has been widely examined and the results commonly reveal a mood-congruence relationship. For example, salespeople with upbeat demeanor have been found to encourage purchasing behavior (Pugh, 2001) while lawyers using an aggressive and angry tone have been found to obtain compliance from their rivals (Pierce, 1995). A common theme throughout much of the research in this area is the focus on behavior in normal everyday situations. Hence, what remained unknown is whether the mood performance relationship extended to situations that are rarely experienced, such as that tested in the present research, namely, an unscheduled evacuation of an aircraft.

The results from the present research suggest that the effects of mood on performance are similar irrespective of the context or situation in which performance is examined. Moreover, performance in a nonnormal situation such as an unscheduled evacuation of an aircraft revealed that individuals in the positive mood manipulation group outperformed individuals in the negative mood manipulation group, in terms of the time to complete the evacuation. Similarly, participants in the positive mood manipulation group committed notably fewer errors than participants in the negative mood manipulation group during the same evacuation exercise. This effect appeared largely as a result of the negative mood manipulation, as no statistical differences were noted between before and after manipulation of mood in the positive mood manipulation group; however, mood did change in the desired direction (discussed further in the Application and Future Research section). These results suggest that mood is an imperative human attribute that can be used as a tool to improve performance and safety. While these results are not new – recall that Muir and colleagues were able to manipulate egress time (negatively affect egress time) in an emergency evacuation through the use of financial incentives – they do offer airlines some insight into simple and effective methods to positively influence passengers' behavior in the unlikely event of an emergency.

Specifically, the results illustrate that a simple exercise such as the presentation of three positive or negative images followed by a short reflection on those images was enough to manipulate mood in the desired direction.

This positive result not only supports previous research in this area (Richards & Whittaker, 1990), it also highlights that the benefits of mood manipulation are not limited to everyday situations but also to situations that are rarely experienced, and for some unimaginable.

As briefly stated in the results section, the tension-anxiety and the confusion-bewilderment mood states of the participants in the positive mood group prior to manipulation were unexpected. Recall that participants were randomly allocated to each group (positive or negative mood group). Such a process should guard against this, which may correct itself by simply increasing the sample size. Despite this unexpected result, the results do, however, trend in the predicted direction given the experimental manipulation. As would be expected, experiencing an unscheduled evacuation of an aircraft, albeit a mock situation, produces increased levels of tension. However, being in a positive mood reduces the extent to which this spikes.

Application and Future Research

From an applied perspective, these results have important implications. Moreover, consider the situation this study was attempting to replicate, namely, an emergency ditching shortly after take-off and not long following the preflight safety brief; a situation similar to that recently experienced by US Airways flight 1549 that made an emergency landing in the Hudson River (National Transportation Safety Board, 2010). Hence, based on the results of the present research it would seem that the delivery of this brief is an opportunity to not only educate passengers about how to perform in an emergency, but also to positively manipulate their mood and ultimately their performance if something untoward were to occur. However, this remains untested and is an area for future research.

Future researchers could also examine other simple and nonevasive methods of manipulating mood in such an environment. For example, it is well known that certain colors, namely, cool colors such as yellow have a calming effect (Samuels, 1999; Stone & English, 1998). Similarly, too little light or too much light can also adversely affect mood (Kuller, Ballal, Laike, Mikellides, & Tonello, 2006) as well as certain music (Moon et al., 2014; Zwaag et al., 2012). Hence, whether strategically using colors, light, or music in certain areas of an aircraft can manipulate mood and ultimately performance in both normal and nonnormal situations remains unknown.

The present research also largely employed young university students (average age 21.90 in Stage 2) with the majority of the students being male. Despite some studies conducted by scholars such as Phillips, Smith, and Gilhooly (2002), illustrating that older adults have greater executive function (i.e., judgment, control, and planning) impairment than young adults when their mood is manipulated, it remains unknown whether this effect is present during an emergency situation as tested in the present research, and hence is another area for future research.

It also needs to be acknowledged that the experimental sequence likely impacted participants' mood in Stage 2 of the present research. Recall Stage 1 tested the efficacy of the mood manipulators in isolation, which proved effective in the manipulating participants' mood in the desired direction. However, following the unscheduled evacuation Stage 2, participants' TMD score in the positive mood manipulation group did not vary statistically from their pre-test score. In addition, their subscores on the Tension and Confusion factors notably increased (in addition, negative mood manipulation amplified participants' mood in the negative mood manipulation group), which was also unexpected. Hence, it is conceivable that the unscheduled evacuation adversely affected participants' mood. Therefore, future research should examine alternate nonevasive measures for mood to appropriately document this impact. However, at present there are no known tests that fit this description; nonetheless when these become available, this is an area for future research.

Future research could also be extended to examine the validity of the preflight safety briefing. While the briefing was central to the present research, whether its effectiveness in conveying safety-critical information remains strong or there are better alternatives remains unknown.

Limitations

While the results of the present study reflect favorably on the relationship between positive mood and performance in a nonnormal situation, they are not without their limitations. The most obvious being that the research was conducted in a mock setting as opposed to a real aircraft cabin. For ethical reasons the latter could not be employed; however, whether performance would have differed if the study was conducted in an aircraft remains unknown. One nonevasive method that may assist, in part validating these results, would involve the use of simulation models that have been developed based on actual aircraft evacuation data (see Galea, 2006; Miyoshi, Nakayasu, Ueno, & Paterson, 2011).

Attention should also be drawn to the sensitivity of the mood scale employed in the present research. While the POMS questionnaire has been used extensively (Shacham, 1983; Terry et al., 2003), it must be acknowledged that it is a self-reported scale, and as with all self-reported scales, responses can be manipulated. Although there is no evidence from the present research to suggest participants

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manipulated their responses on this scale, it does need to be noted that this could have occurred and future research should consider employing alternate mood measures to guard against this.

Conclusion

In conclusion, this study examined the relationship between mood and performance in aviation during a nonnormal situation (i.e., emergency). This research followed Richards and Whittaker's (1990) mood manipulation methodology by examining participants' mood before and after a cabin emergency egress. The results reflect that in normal situations positive mood improved performance in terms of error reduction and time to complete task, while negative mood reduced performance. For the aviation industry and other safety-critical industries, the results suggest organizations and personnel within these industries should aim to create an environment that encourages a positive mood state, thereby facilitating in performance if something untoward were to occur.

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Pre-flight safety briefings, mood and information retention

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ABSTRACT

Mood is a moderating factor that is known to affect performance. For airlines, the delivery of the pre-flight safety briefing prior to a commercial flight is not only an opportunity to inform passengers about the safety features on-board the aircraft they are flying, but an opportunity to positively influence their mood, and hence performance in the unlikely event of an emergency. The present research examined whether indeed the pre-flight safety briefing could be used to positively impact passengers' mood. In addition, the present research examined whether the recall of key safety messages contained within the pre-flight safety briefing was influenced by the style of briefing. Eighty-two participants were recruited for the research and divided into three groups; each group exposed to a different pre-flight cabin safety briefing video (standard, humorous, movie theme). Mood was measured prior and post safety briefing. The results revealed that pre-flight safety briefing videos can be used to manipulate passengers' mood. Safety briefings that are humorous or use movie themes to model their briefing were found to positively affect mood. However, there was a trade-off between entertainment and education, the greater the entertainment value, the poorer the retention of key safety messages. The results of the research are discussed from both an applied and theoretical perspective.

1. Introduction

In time critical situations, such as a rapid disembarkation during an aircraft emergency evacuation, passengers' irrational, counter-productive, and erroneous behaviour has the potential to cause serious consequences. As a result, aviation governing bodies such as the Federal Aviation Administration (FAA) in the United States and the Civil Aviation Safety Authority (CASA) in Australia mandate that airlines brief passengers on emergency procedures prior to every flight (FAA Federal Aviation Regulations (FAR) 135.117 – FAA, 2014; CASA Civil Aviation Orders (CAO) 20.11.14 – CASA, 2009). However, not all passengers attend to these briefings (National Transportation Safety Board – NTSB, 2000) and for those that do, some behave contrary to the information or instructions given. The NTSB (2000) noted that improper behaviour such as arguments, pushing or climbing over seats and removing baggage from overhead lockers were all common behaviour during emergency evacuations.

While failure to attend to the safety briefing in the first place may in part account for unruly behaviour, considering the relationship between mood and performance, ensuring passengers are prepared cognitively (i.e., in the right state of mind) to deal with the stressors of an emergency situation has also the potential to improve performance. Thus, the pre-flight safety briefing may provide airlines a unique opportunity to not only educate passengers about the safety features of the aircraft, but a chance to positively influence their state of mind, ultimately affecting performance. Since mood is often linked to performance (Kelly and Barsade, 2001) and is relatively simple to manipulate (Valdesolo and DeSteno, 2006), the present study sought to investigate if varying the content of the pre-flight safety briefing was a simple and effective way of achieving this goal.

Mood is a moderating factor similar to fatigue or noise, which affects behaviour (Tehrani and Molesworth, 2015). According to Russell (2003), mood is a prolonged affective state which is said to be divorced from any direct event or object. In contrast to emotion, which relates to specific events or objects and is short lasting, mood is generally long lasting. Positive mood has been linked to performance improvements in areas such as maths (Bryan and Bryan, 1991), attitudinal changes (Smith, 1993) and cognitive processing (i.e., heuristic processing; Batra and Stayman, 1990). Similarly negative mood has been linked to poor performance in areas such

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as team process (i.e., social cohesion, workload sharing, team conflict; Jordan et al., 2006), academic achievement (Lane et al., 2005) and computational game-based learning (Jackson and McNamara, 2013).

In aviation, Tehrani and Molesworth (2015) exploited the benefits of manipulating mood in a study which involved examining participants' response to a simulated aircraft ditching scenario (emergency landing in water) shortly after take-off. They found by simply presenting images of unpleasant scenes such as violence, they were able to instil a negative mood state in participants, as measured using Shacham (1983) Total Mood Disturbance (TMD) score. Conversely by presenting pleasant images such as flowers, they were able to instil a positive mood state in participants. Following mood manipulation and shortly after exposing all participants to the same pre-flight safety briefing, they simulated an in-flight emergency, resulting in an emergency aircraft ditching. They found that participants who were in a negative mood state committed seven times more errors during the evacuation procedure than participants in the positive mood state, errors such as failing to take personal life vest and carrying personal belongings to the emergency exit. Similarly participants in the negative mood state took almost twice as long to evacuate the aircraft than participants in the positive mood state.

According to Johnson (1979), airline passengers that fail to attend to the pre-flight safety briefing often underestimate the importance of the material contained within these briefings. A large proportion of the non-attenders were young educated males who felt they already knew the content of the pre-flight safety briefing. Fennell and Muir (1992) and Seneviratne and Molesworth (2015) report that frequent travellers find the pre-flight safety briefings repetitious, uninteresting and boring; as a result, a large portion of passengers remain inattentive during such briefings (NTSB, 2010). However, Molesworth (2014) contends that both airlines and aviation authorities need to take some responsibility for poor passenger behaviour in an emergency. For example, a review of three commonly employed pre-flight safety briefings found that there are between 34 and 41 key safety messages presented, which passengers are expected to extract and remember. The time provided to extract these messages average three and a half minutes. Not surprising, Molesworth found that participants attending to these messages could recall no more than 50 per cent of the key safety messages, which may explain why passengers behave contrary to the instructions in these safety briefings during an emergency (NTSB, 2000).

In 2012, a Jet2 B737 filled with fumes and smoke from one of the aircraft engines aborted take-off at Glasgow Airport and the crew completed an emergency evacuation (Air Accident Investigation Branch – AAIB, 2013). Some passengers reported they were hampered during the emergency evacuation by other passengers recovering personal items from the overhead lockers, a behaviour that is condemned in the safety briefing. Other passengers reported that after exiting the aircraft via the emergency exit over the wing, decided to re-enter the aircraft to exit by a door with a slide, rather than sliding down the surface of the wing. In a separate incident in the United States involving the forced ditching of a US Airways Flight (Flight 1549), passengers appeared to also behave in a manner contrary to the instructions provided in the pre-flight safety briefing and/or on the safety card. Moreover, only three per cent of passengers (5 passengers) retrieved their life vest from under their seat after the emergency ditching (NTSB, 2010). The NTSB also uncovered that less than one fifth of passengers (17% – 25 passengers) reported watching the majority of the pre-flight safety briefing while even less (8% or 12 passengers) reported reading the safety card before or during the flight (NTSB, 2010).

In an attempt to boost passengers' interest in the safety briefing, some airlines are utilising marketing techniques, such as employing humour to convey information or using celebrities to deliver the message (Nataraajan and Chawla, 2008). For example, Qantas in Australia and Virgin America in the United States employ celebrities to attract the attention of passengers in one of their safety briefing videos, while Air New Zealand model some of their briefing videos on popular movies or sporting events such as the Hobbit series of movies or the rugby world cup. Delta Air Lines in the United States employ humour in one of their safety briefing videos as a method to boost passengers' attention.

Tehrani and Molesworth (2015) contend that there are added advantages to improving the quality of the safety briefing on aircraft. Apart from the obvious improvements in knowledge, providing a briefing that carefully incorporates humour can positively impact on passengers' mood, which in turn can translate into improved performance (i.e., during an emergency evacuation). However, Smith (1993) offers a word of caution when using humour in advertising. He contends that humour can disrupt the systematic processing of target/advertising material/information, resulting in the target message being lost to the humorous message. Chan (2011) found that indeed humour can disrupt the processing of the target message in a study with 253 university student and five different advertisements (two humorous, two non-humorous and one neutral). Moreover, while the humorous advertisements were more successful in gaining the attention of the students, they were found to cause more disruptions during the processing of the message.

Mackie and Worth (1989) found similar results in an experiment with university students where after manipulating the mood state of half of the students through a process where they were led to believe they were lucky in a lottery draw, students read a recently delivered speech on government control and acid rain. The other half of the students did not enter a lottery draw and hence did not have the opportunity to win money, as a result were categorised as mood neutral. Two versions of the speech were presented, one containing weak arguments and a second containing strong arguments. Under time pressure to review the speech, the students in a positive mood evaluated both speeches similarly, while the students in the neutral mood relied on the persuasive augments in the strong argument speech to alter their perception. Mackie and Worth interpreted these results as evidence that positive mood adversely affects individuals ability to systematically process information.

The present research extends the research conducted by Tehrani and Molesworth (2015) and investigates the benefits of including humour or familiar movie themes/characters in pre-flight safety briefings on improving passengers' mood as well as their ability to recall key safety messages presented within the briefing. Hence, the present research seeks to investigate if:

1. Employing humour or celebrities in a pre-flight safety briefings can positively affect individuals' mood, and
2. Whether the use of humour or celebrities in a pre-flight safety briefing adversely affect the retention of the key safety messages conveyed in the briefing?

2. Method

2.1. Participants

A total of 82 participants (55 male, average age of 19.36 years and 27 female, average age of 19.26 years) with an overall average age of 19.33 (SD = 2.04) years were recruited from the student population at the University of New South Wales (UNSW) Australia for the research. All students volunteered their time and as a result, no reimbursement was provided. The research was approved in advance by the UNSW Australia Ethics Panel.

2.2. Design

A 2 × 3 mixed repeated measures design with mood comprising two levels (mood prior and mood after) as the repeated measure variable and the pre-flight safety briefing video as the between groups variable (standard video, humorous video, movie theme video) was employed. Mood as measured by the Total Mood Disturbance (Shacham, 1983) featured as one of the dependent variables and recall performance in terms of key safety messages represented as a percentage featured as the second dependent variable.

2.3. Material

The material comprised: an information sheet, consent form, demographics form (i.e., age, sex, previous flight experience), Profile of Mood State Questionnaire – Short Form (POMS-SF; Shacham, 1983), pre-flight safety briefing video A (standard video), pre-flight safety briefing video B (humorous video), pre-flight safety briefing video C (movie theme video), and a comprehension test form. The comprehension test form, previously employed by Barkow and Rutenberg (2002) and Molesworth (2014) contained a number of headings corresponding to the key safety message themes within each safety briefing video (see Table 1). In completing the comprehension test form, participants' task was to recall as much as they could from each video as guided by each safety message heading. Not surprising, and since the three pre-flight safety videos were produced for the same organisation, and the material to be covered in the briefings is dictated by governing bodies such as the FAA in the Unites States and CASA in Australia, the main safety themes in each video were largely the same.

The standard pre-flight safety video (video A) used a male narrator to deliver the safety message. Each section of the video was signposted by a theme heading such as cabin baggage, seatbelt, oxygen and so on as outlined in Table 1. In each theme, actors demonstrated the desired behaviour relating to the safety messages. In addition, for the purpose of this study, the video subtitles were removed. The total duration of this video is 2 min and 55 s (see Table 2).

The humorous pre-flight safety video (video B) is designed to be a humorous safety video which follows the same format as video A. However, introducing the video are two personnel dressed as cabin safety officers. In contrast to video A, each section of the video is not signposted and the personnel featured in the video are all dressed in aerobic clothes and when possible, dance between key safety messages. A male who is similarly dressed in aerobic clothes explains the safety features of the aircraft, interjecting humour where possible while performing choreographed disco moves. Throughout the video, the dance music similar to the 70s disco music features and the lyrics to the song are only audible when there are long breaks between safety messages. The video concludes with the same two people introducing the video and wishing passengers an enjoyable flight. The total duration of this video is 3 min and 39 s (see Table 2).

The movie theme pre-flight safety video (video C) is set in the theme of a popular movie series and as such uses appropriately dressed individuals to both convey safety messages and feature in the video. The video delivers the same key safety messages as in the other two safety videos however, with additional information specific to the aircraft and its configuration such as Business Premier. The total duration of this video is 4 min and 27 s (see Table 2).

The equipment comprised an IBM compatible personal computer, NEC (PA550W) data projector, 2 × 3 m projector screen and two Bose speakers. Statistical Package for the Social Sciences (SPSS) version 21 was used to analyse all data.

2.4. Procedure

All participants were recruited by direct invitation from selected lecture theatres of the University of New South Wales and randomly divided into three groups. After a short introduction they were asked to complete the consent form followed by the POMS-SF questionnaire. Then each group was asked to watch their respective pre-flight safety briefing video. Directly following the video, they were asked to complete a second POMS questionnaire, followed by the comprehension task and finally the demographics questionnaire. The total time taken to complete the study per group was approximately 25 min.

3. Results

3.1. Data reduction

The aim of the present research was twofold. First, to investigate if the pre-flight safety briefing provided by airlines prior to a commercial flight was effective in manipulating individuals' mood. Hence, participants' mood was assessed using Shacham (1983) Total Mood Disturbance score, extracted from the POMS-SF questionnaire. The formula for the TMD was: Depression-Dejection + Tension-Anxiety + Anger-Hostility + Fatigue-Inertia + Confusion-Bewilderment + (24 − Vigor-Activity). Second, the present research sought to examine the extent to which individuals could recall the key safety messages in the safety videos. In relation to the second aim, namely examining participants' recall of key safety messages, number of key safety messages recalled was represented as a percentage based on the total number of safety messages in each briefing. However, prior to being able to calculate

Table 1
Topics covered in the pre-flight safety videos and the objective of the key safety messages.

Topic	Objective of message
1 – Baggage	Storage Locations
2 – Seat belt	Operation of Seat belts
3 – Oxygen	Operation and timely usage of oxygen
4 – Brace position	Brace position during emergencies
5 – Life jacket	Location and timely usage of life jackets
6 – No smoking	Fire hazards and no smoking policy
7 – Lights	Guidance to the aircraft exit doors by the floor aisle lights
8 – Exits	Location of emergency exits and selection of nearest exit
9 – Electronic devices	Electronic devices and their interferences with aircraft systems
10 – Seat position	Seat adjustment prior to take-off & landing

Table 2
Key components in the three pre-flight safety briefing videos.

Content	Video A (Standard)	Video B (Humorous)	Video C (Movie theme)
Audio humour	Nil	Yes	Nil
Visual humour	Nil	Yes	Nil
Movie themed	No	No	Yes
Male &/or Female voice-over	No	Yes	Yes
Male narrator	Yes	No	No
Number of key safety messages	35	34	38
Video duration (minutes.seconds)	2.55	3.39	4.27

this, the number of key safety messages present in each safety video had to be extracted. The process to achieve this involved, writing out each script from the respective video, extracting key safety messages, and then categorising the safety messages. To ensure consistency and accuracy of coding, two coders independently extracted the key safety messages from each pre-flight safety briefing. A consensus was achieved and a final list of key safety messages was produced for each safety briefing video. These lists were employed by the coders who scored all responses independently. Any discrepancies were discussed, resulting in a consensus, thereby achieving an inter-rater reliability of 100%. Finally, in order to reduce the likelihood of prior exposure to the pre-flight safety video adversely influencing the results, data from only the participants who had not seen their respective pre-flight safety video was analysed; 10 participants (# 4, 5, 56, 57, 58, 63, 64, 68, 72, 78; two from video group B, eight from video group C) had previously seen the respective pre-flight safety video and hence were removed from the study.

3.2. Mood scores

Prior to the main analysis, it was important to determine that the random allocation of participants to three experimental groups was successful. As a result, participants' mood score (i.e., TMD score) prior to watching the pre-flight safety video for the three groups (Standard video, Humorous video, Movie Theme video), was analysed with a one-way analysis of variance (ANOVA). With test assumptions of normality and homogeneity of variance satisfactory, the results failed to reveal a statistically significant difference between groups, $F(2, 66) = 1.376$, $p = .260$. This result suggests that all participants had a similar mood prior to the experimental condition.

To determine if participants' mood changed as a result of exposure to the various videos, a second ANOVA was conducted comparing mood scores between groups. With test assumptions of normality and homogeneity of variance satisfactory, the results revealed a statistical significant difference between group, $F(2, 66) = 7.469$, $p = .001$. In order to determine where the differences lie, three separate repeated measures tests were performed, comparing TMD scores prior to the video with TMD scores post video. With alpha adjusted to .017 to control for family wise error (i.e., Bonferroni adjusted; $\alpha = 0.05/3$ when three analyses were performed), the result of the first repeated measures analysis comparing TMD scores prior and post the Standard video (video A) failed to reveal a statistical difference $t(24) = .911$, $p = .372$. Hence, the mood of participants in the Standard video group (video A) did not change significantly. In contrast, a significant difference was noted between TMD scores pre and post pre-flight safety video for participants in the Humorous video group (video B), $t(25) = 2.652$, $p = .014$, as well as for participants in the Movie Theme video group (video C), $t(20) = 3.546$, $p = .002$ (see Table 3). A lower TMD score indicates a more positive mood. Hence, this result suggests that the Humorous video as well as the Movie Theme video were effective in improving participants' mood.

In order to determine if prior viewing experience influenced participants mood following the video, in particular with video C (Movie Theme pre-flight safety briefing video) since there are to date five movies which relate to the content of the pre-flight safety briefing video (video C), a correlational analysis examining exposure to these five movies (i.e., the number of videos participants had seen from this series) and mood following the pre-flight briefing video C was conducted. The results of a Pearson product–moment correlation failed to reveal a relationship between prior video viewing and mood post pre-flight safety video C, $r(20) = -.392$, $p = .088$. This result suggests that prior exposure to the five movies had no noticeable effect on participants' mood.

3.3. Information recall

In order to determine if participants' ability to recall the key safety messages in each pre-flight safety video differed, a separate one-way ANOVA was conducted. Consistent with the previous analyses, the number of key safety messages recalled for the three groups (Standard, Humorous, Movie Theme) was analysed. With test assumptions of normality and homogeneity of variance satisfactory, the result revealed a statistically significant difference between group, $F(2, 69) = 17.13$, $p < .001$. Fisher's Least Significant Difference (LSD) post hoc comparisons revealed the significant difference lie between the Standard video (video A) and the Humorous video (video B; $M_{Diff} = 17.54$, $p < .001$) and between the Standard video (video A) and the Movie Theme video (video C; $M_{Diff} = 13.30$, $p < .001$). As can be seen in Table 4, this result suggests that the use of humour in a pre-flight safety video or movie theme is not an effective method of facilitating recall of information compared to a pre-flight safety briefing video without humour.

Table 3
Total Mood Disturbance score prior to safety video exposure and post safety video exposure for each experimental group.

Group (n)	TMD prior		TMD post	
	Mean	SD	Mean	SD
A – Standard video (27)	26.02	2.14	26.43	3.11
B – Humorous video (25)	26.12	3.32	24.64	2.45
C – Movie Theme video (20)	24.98	1.48	23.52	1.72

Note: n = participants in each group.

Table 4
Recall performance of key safety messages distributed across group.

Group (n)	Mean % (SD)	Range (Min – Max)	Median
A – Standard video (27)	54.70 (9.29)	38.00–74.00	53.00
B – Humorous video (25)	37.16 (10.46)	21.00–59.00	35.00
C – Movie Theme video (20)	41.40 (14.27)	8.00–71.00	47.00

Note: n = participants in each group.

Since aviation authorities largely govern the safety material covered in safety briefings and 75 participants noted that they had flown on a commercial aircraft at least once in the last five years, it is plausible that prior exposure the pre-flight safety briefing in the present research acted as a reminder to this material, and therefore facilitated in recall of information not specific or unique to the safety briefing viewed in the present research. However a review of the key safety messages suggest that if this occurred, it may have been minimal. This is because a number of the key messages recalled such as 'electronic devices even cool ones can interfere' (e.g., electronic devices can interfere with aircraft equipment) or 'Captain says let's kick butt' (e.g., smoking is not permitted on board aircraft) were unique to the videos under examination. This result seems to be further supported by a series of correlational analyses which failed to find a relationship between prior flight experience (number of flights in last year or five years) and safety information recall, largest r, $r(69) = .060$, $p = .622$.

4. Discussion

The primary focus of aviation governing bodies such as FAA in the United States, Transport Canada and CASA in Australia is to enhance safety by setting regulations for their local carriers (Chena and Chena, 2012). For airlines this translates into rules, procedures and systems to either eliminate or reduce the likely impact of hazards on their operation (i.e., manage risk). For passengers of these airlines, one obvious risk control measure is the pre-flight safety briefing provided prior to the flight that is made to educate them about the safety features of the aircraft they are flying and how to behave in the unlikely event of an emergency. However for many passengers, the pre-flight safety briefing is deemed repetitive, familiar (i.e., old information), and/or boring (Fennell and Muir, 1992; Seneviratne and Molesworth, 2015). According to Tehrani and Molesworth (2015), the preflight-safety briefing is also an opportunity for airlines to positively influence passengers' mood. The benefit of positively influencing passengers' mood would be evident in situations such as the US Airways (Flight 1549) accident in 2009, which experienced an in-flight emergency shortly after take-off and cabin crew were left with little time to prepare the cabin for emergency evacuation (NTSB, 2010).

The results of the present research suggest that indeed the pre-flight safety briefing video can be used as a tool to manipulate passengers' mood. Moreover, providing participants with an entertaining safety video that is either comical or familiar to them serves as a method of enhancing their mood. In contrast, providing a video that is void of humour or entertainment value fails to positively influence mood. However there appears to be a trade-off between entertainment and education. Specifically the results of this research suggest that the greater the entertainment value, the poorer the retention of key safety messages. For many airlines, this result would be disappointing as it fails to reward their efforts for being creative and trying to re-engage passengers with crucial safety related information (or marketing). Similarly for passengers, this result would appear disappointing as such videos appear to directly address their complaints as to the reasons why they fail to attend to such information (e.g., repetitive, familiar with content, boring).

The results of the present research reinforce the concerns expressed by Molesworth (2014), Tehrani and Molesworth (2015) and Seneviratne and Molesworth (2015) who note that passengers' retention of information following exposure to safety briefing information is poor at best. Remember Molesworth found that on average participants could recall approximately half of the key safety messages presented in the safety videos. The results of the present research found that recall rates were slightly less, on average 44%. These results are alarming and suggest that the aviation industry need to rethink their strategy of passenger education and either examine alternate methods to delivering this information or investigate methods of improving the delivery of this information so that it is more memorable.

The results also highlight the complex relationship between mood and performance. While Tehrani and Molesworth (2015) found participants in a positive mood performed better during the simulated emergency evacuation compared to participants in a negative mood state, in terms of time to complete the evacuation as well as number of errors committed during the evacuation procedure, the results of the present research suggest that improved mood adversely affects recall of key safety messages. This is despite the script employed to deliver the key safety messages in each video being largely the same (safety briefings all from same airline however slight variations in script specific to aircraft type).

There are various reasons which may account for these results, the most notable relates to the cognitive processing of the information in the safety videos. Specifically, in both the Humorous and Movie Theme video, addition stimuli required to set the theme of each video (i.e., attire and humour) is present, such stimuli has the potential to increase the cognitive load and or disrupt the cognitive processing of key information (i.e., safety messages). Similarly, flying or the thought of flying may increase an individual's anxiety level or conversely reduce these (i.e., low level of arousal) in the case of a frequent flyer. In both situations, experiencing less than optimum levels of stress or arousal can hinder passengers' ability to acquire desired information.

In terms of the former, Batra and Stayman (1990) found a similar effect with humour in advertisement where humour seemed to secure attention, but disrupted processing of the key messages. It is thought that this results from participant paying close attention to the humorous part of the message (or advert) at the expense of the advertised message (Chan, 2011). In the case of the latter, Eysenck (1979) noted that people perform poorly in exams because of stress and anxiety which is due to wariness and unlike arousal it slows down memory and other responses. Hence, future researches should be directed to investigate the link between mood and information processing and examine other techniques to manipulate mood as humour, while attracts attention, can hide or mask the key messages being delivered (i.e., flight safety). This can be examined by employing different stimulus modes such as using colours (Yildirim et al., 2007), music (Young et al., 2012), pictures or motivational methods (Richards and Whittaker, 1990) such as winning prizes to determine if the recall performance is as the result of the positive mood itself or the method in which the mood is attained.

Future research should also examine response accuracy decrements over time. Moreover, the present research focused on examining participant' recall performance directly following exposure to a pre-flight safety briefing. However an in-flight emergency may occur at any time throughout a flight, and as a result, passengers may be required to recall and apply knowledge acquired from the pre-flight safety briefing which they were exposed to at the start of the flight. One simple and effective method to examine response accuracy decrements over time is to pair the recall point with key segments of flight, such as: take-off, climb, cruise, top of descent, and landing.

Furthermore, future research should also be directed to investigate how contextual factors such as the environment of an aircraft, namely noise, seating and how visual acuity affects individuals recall of the safety messages as well as mood. It is important to note that the quality of the videos employed in the present research along with the respective audio was of high quality. Considering these factors have been reported prior as key determinants as to why passengers fail to attend to preflight safety briefings (Fennell and Muir, 1992), future research should examine their impact on retention of information from briefings. In addition, future research should attempt to duplicate these findings with a more diverse range of participants since the average age of the participants in the present study was approximately 20 years of age.

5. Conclusion

As required by law, airlines provide all passengers a safety briefing prior to every flight. For many passengers, this briefing is viewed as repetitious and boring. This has led some airlines to transform their briefings, making them more humorous and entertaining. Humour has many benefits, one of which includes positively affecting mood, which can affect performance (i.e., reduce errors and time to complete task). However, the results of the present research suggest that there appears to be a trade-off between improving the entertainment value of a pre-flight safety briefing using humour and education, and safety information retention. For airlines these results suggest careful attention needs to be provided towards the creation of pre-flight safety briefings so that they capture and maintain the attention of the passengers, while at the same time refrain from diverting important cognitive resources away from processing the key safety messages contained in the safety briefing.

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