THE MIND CRAFT PROJECT – HEALTHY MINDS, HEALTHY PILOTS: A LITERATURE REVIEW ON MINDFULNESS MEDITATION PROGRAMS FOR COMMERCIAL AIRLINES PILOTS

Anita Vandyke *B.Eng (Aeronautical) (Space)*

BACKGROUND

Mental health is an important issue for the aviation industry as it directly impacts on the wellbeing of pilots. Moreover, a pilot's mental health can directly affect the safety of passengers and needs to be treated as a public safety issue. Following the 2015 Germanwings crash, aviation agencies around the world have drawn up policies requiring medical professionals to warn authorities when a pilot's mental health could threaten public safety. The Bureau d'Enquêtes et d'Analyses (BEA) investigation following the crash provided recommendations about monitoring the mental health of pilots and better screening before a pilot is certified. The BEA also recommended peer support groups and other measures to remove the stigma and fear of losing their ability to work due to mental health issues. In light of this investigation, it is important to consider how airlines and the aviation industry can better support pilots' mental and physical well-being.

In recent years, there has been an increasing amount of research indicating mindfulness meditation provides a myriad of benefits including physical, psychological and performance improvements. As a result, many workplaces such as Google and Huffington Post have implemented workplace mindfulness practices to help improve employee mental health. The U.S. Army has also implemented the Mindfulness-based Mental Fitness program, with positive results.[9] Large corporations are investing heavily into mental health programs and research is showing that mind-body programs are cost effective practices that can greatly improve an employee's overall wellbeing.

With increasing interest in mindfulness in business, government and academia, mindfulness has received comparably little attention in the aviation industry. Whilst there are Employee Assistance Programs in Australian transport organisations and also peer-support programs in QANTAS and other airlines, there is little research conducted on the benefits of mindfulness for pilots.

ABSTRACT

Following the 2015 Germanwings crash, aviation agencies around the world have drawn up new policies relating to management and monitoring of the mental health of pilots. The Mind Craft Project is a literature review that provides an overview of current practices in mindfulness meditation programs in the aviation industry and propose new mind-body programs for pilots for implementation. Mental health is an important issue for the aviation industry as it directly impacts on the wellbeing of pilots. Moreover, a pilot's mental health can directly affect the safety of passengers and needs to be treated as a public safety issue.

This literature review has demonstrated that the implementation of a mindfulness training program could be a feasible and acceptable method for implementation in a commercial aviation environment to help ease stress, increase concentration and assist in mental health risk management. A few potential limitations to mindfulness interventions were uncovered such as the effectiveness of mindfulness for suicidal tendencies, and cultural behaviors in regards to mental health issues in the aviation industry. However, further research

ABOUT THE AUTHOR

Anita Vandyke is a qualified rocket scientist, holding a Bachelor of Engineering in Aeronautical Space who now studies medicine. She was a scholarship winner to the 2016 ASAM Annual Scientific Meeting.

CORRESPONDENCE

anita.vandyke1@my.nd.edu.au

needed as there has been little research conducted on mind-body programs for commercial airline pilots. Recommendations were provided for a follow-up long term study.

OBJECTIVES

The objective for this project is to perform a literature review to provide an overview of current practices in mental-health programs in business and government organisations, how it is utilised in various clinical and organisational settings, and propose new mind-body programs for pilots for implementation into the aviation industry.

DEFINITIONS

There are two types of mindfulness meditation that are discussed in this literation review:

- Mindfulness meditation for mental wellbeing- this includes lowering of stress levels and increased excellence in job performance
- Mindfulness meditation for prevention of mental illness – this includes prevention of long term mental illness including depression, anxiety and post-traumatic stress disorder

Mindfulness Meditation for Mental Wellbeing

Mindfulness practice originated in Buddhist traditions where it occupies a central place in a system designed to lead to the cessation of mental suffering (Thera, 1992). Mindfulness meditation is a psychological intervention tool that has been shown to be of particular value for people who work in stressful environments who need to excel in their chosen fields. Mindfulness was introduced into secular therapeutic settings through the work of Kabat-Zinn (Kabat-Zinn, 1990) who created mindfulness-based stressed reduction (MBSR) therapies for enhancing well-being and reductions in psychological distress.

Mindfulness Meditation for Prevention of Mental Illness

Mindfulness meditation has also been considered for prevention of mental illness. This has been examined by the work of Van Der Kolk (Van Der Dolk, 2014). His work explores treatments for post-traumatic stress disorder, childhood trauma and other mental illnesses as a product of trauma. He explores mind-body techniques for people with the severest forms of trauma. Mindfulness meditation is one technique he discusses for prevention and treatment of those individuals with mental illness.

Mindfulness meditation is explored in this literature review will consider both these outcomes – mental wellbeing and prevention of mental illness.

SEARCH METHODS

The literature review involved searching PubMed, Google Scholar and EBSCO Host on 3 August 2016.

Articles were filtered according to year of publication, only articles published within the last 20 years were considered and only those that were written in the English language were used. These limitations were used because:

Aviation technology has changed significantly over the past 20 years; it is only appropriate to consider articles published within the last year 20 years to ensure currency of information

English language articles were only used – translation of articles proved to be difficult within the time constraints

Searching other Resources

Additional items were identified through hand-searching of reference lists of relevant retrieved articles. Conference proceedings, policies and regulations, meeting abstracts were also searched for relevant mental health management issues.

Inclusion Criteria

The following key terms were considered for inclusion for review:

- Industry: Aviation, aerospace, airline, pilots, military
- Type of mind-body training included: Mindfulness, meditation, mind-body
- Mental health issues: Depression, anxiety, stress management, suicide

DATA COLLECTION AND ANALYSIS

The methodology included:

- screening the titles and abstracts of all retrieved citations against the inclusion criteria
- reviewing full-text copies of studies that met the inclusion criteria

RESULTS OF LITERATURE REVIEW

Australian Policies and Regulations

Section 6.1 of the Designated Aviation Medical Examiner's Handbook issued by the Civil Aviation Safety Authority (CASA) outlines the Psychiatry assessment procedures for pilots, other aircrew members and air traffic controllers (ATC) who suffer or who may suffer from psychological disorders or psychiatric disease. CASA outlines the purpose of these assessments is '*to ensure that applicants do not suffer from psychological disorders or psychiatric disease … may jeopardise the safety of air navigation. A particular concern is the potential for an affected individual to commit an unsafe act that impairs the safe operation of an aircraft.*'

CASA states that '*the presence of a significant risk at any time during the course of a depressive illness will be disqualifying for pilots and ATCs… Certification may be considered if specialist psychiatric opinion*

confirms that a pilot or ATC who has attempted or considered suicide represents a low risk to aviation safety. Applicants who have a history of multiple suicide attempts will not usually be granted a medical certificate.'

CASA has provided a fact sheet relating to depression and aviation safety stating that CASA 'makes decisions on a case by case basis'. Their approach to medical certification is that a well-managed depression is compatible with medical certification. However, any relapse in depressive symptoms and changes to medication must be reported to the Designated Aviation Medical Examiners (DAMEs).

Current Mental Health Management Practices in Aviation

Maintaining mental well-being can be challenging for large organisations, especially for organisations in which an employee's mental health can impact on safety of the public. Large transport organisations have recognised the importance of 'safety before schedule', whereby material risks and safety concerns are addressed through vigorous safety reporting mechanisms and well-defined legislative requirements. However, mental health management proves to be an issue that is hard to assess and manage. The Aerospace Medical Association (Scarpa, 2014) recognises "*that there may be barriers affecting a frank discussion of mental health issues between an aeromedical examiner and a pilot*", due to an ingrained culture of fear, in which the pilots fear losing their medical clearance certificate and thus, losing their jobs.

Currently, the Allied Pilots Association (American Airlines Pilots union) has a program called 'APA Project Wingman', which aims to provide a confidential "safe zone" of peer Employee Assistance Programs (EAPs) without retribution. The project aims to provide counselling, referral to competent professional authority, public outreach to increase awareness, and de-stigmatization of mental health care. This has resulted in dramatic increase in reporting & counseling for pilots. (Scarpa, 2014)

There are similar programs that exist within airlines around the world to provide assistance to pilots, and sometimes more generally to airline employees, to help in times of personal or emotional distress. In Germany, there is the Mayday Foundation, a program to assist aircrew in handling highly stressful person and professional events and Anti-Skid, a program available for pilots who suffer from alcohol abuse problems.

Similarly, in Australia, QANTAS has a Pilot Assistance Network (PAN) which is a peer support program aimed at mental health promotion, providing counselling and support services for pilots and their families. However, there are no known preventative mental health programs such as mindfulness meditation, yoga or other mind-body practices.

Since the mid-1970s, the union's pilot assistance programs have helped several thousand pilots suffering mental health issues, however, there has been little research conducted on preventative psychological intervention tools such as mindfulness training.

Benefits of Mindfulness for Pilots

Whilst some research has been some mindfulness research conducted for military pilots, there has been no research conducted on the efficacy and effectiveness for civilian airline pilots, particularly, those working in the commercial airline sector.

Medland et al[10] conducted research on the impact of mindfulness training on a Norwegian military helicopter unit. The study is one of the first controlled studies of the effects of mindfulness training in a high-performing cohort in the aviation sector. The program found that mindfulness training increased the observation skills, created a relaxed and more flexible mind, and that it can help to reduce stress in high-workload situations where attentiveness to the task is particularly important. The study also found that after 12 months of mindfulness training, the pilots had improved attentional control, and arousal regulation. The study concluded that mindfulness training can be helpful in high-demand contexts such as military and civilian aviation.

Employees who have engaged mind-body interventions in their workplace have showed significantly greater improvements on perceived stress, sleep quality, and the heart rhythm coherence ratio of heart rate variability (Wolever et al, 2012). However, since there is so little research conducted on mind-body programs for pilots, it is important to consider other high-stress work environments to better evaluate if mindfulness interventions will be beneficial to commercial airline pilots.

Klatt et al. (2015) conducted a study to determine the efficacy of mindfulness interventions for staff in Intensive Care Units (ICUs). ICUs represent a high-stress work environment where personnel experience chronic exposure to catastrophic situations as they care for seriously injured/ill patients. The study found that work engagement and resiliency increase significantly in the intervention group, compared to the wait-list control group. The study concluded that mindfulness meditation is feasible, well accepted, and can be effectively implemented in a chronically high-stress work environment. Jha et al. (2015) also found positive results in relation to mindfulness training for

increased attention and building resilience for military cohorts.

Similarly, mindfulness meditation showed positive results for in stress management in highly stressed community workers (Nyklìcêk et al., 2013) and patients with chronic illnesses that have prolonged physical stressors. (Cohen et al., 2017).

Limitations of Mindfulness Training

Mindfulness interventions are a practical solution that many corporations have utilised to improve resilience, reduce stress and general well-being. However, is mindfulness training effective for diagnosable psychiatric illnesses with reoccurring depressive symptoms and suicidal thinking?

The BEA report found that the Germanwings pilot was diagnosed with psychosomatic disorder and an anxiety disorderr. AsMA (Scarpa, 2014) stated that serious mental illness such as acute psychosis was relatively rare, and its onset was difficult to predict. Barnhofer et al (2015) found that patients with a history of suicidal depression, training in mindfulness can help to weaken the association between depressive symptoms and suicidal thinking, and thus reduce an important vulnerability for relapse to suicidal depression.

Whilst there has been some research into the benefits of mindfulness meditation for patients with serious mental health issues, there is little research conducted on how these preventative measures prevent suicidal actions of depressed individuals. These activities are difficult to predict and there is little research conducted on how mindfulness techniques can help with severely depressed individuals with suicidal tendencies in the aviation sector. Van Der Kolk (2014) does discuss the benefits of mindfulness meditation with severe mental illness in relation to past trauma. He notes that mindfulness is a good skill to help people manage unbearable feelings which can lead to suicide. However, more research is needed in this domain, specifically for pilots in the aviation sector.

Following the 2015 Germanwings crash, the BEA investigation concluded the following factors may have contributed to the failures in medical certification and self-reporting process:

- The co-pilot's probable fear of losing his right to fly as a professional pilot if he had reported his decrease in medical fitness to an AME;
- The potential financial consequences generated by the lack of specific insurance covering the risks of loss of income in case of unfitness to fly;
- The lack of clear guidelines in German regulations on when a threat to public safety outweighs the requirements of medical confidentiality.[3]

Whilst mindfulness training may assist with stress reduction, increased resilience and better pilot well-being, it does not address cultural behaviours within the aviation industry in regards to the pilot's fear of losing his/her licence due to decreased medical fitness. Hatcher (2010) discusses the importance of a safety culture being the most effective form of risk management in mental health. Hatcher states, commercial aviation has gained an '*impressive reduction in the rate of major aviation incidents and serious incidents over a long period of time… Those changes often resulted from safety recommendations after thorough investigations.*' However, risk management relies on cultural changes, and whilst, the safety culture for commercial airlines has drastically improved, there is still much work to be done for mental health management.

RECOMMENDATIONS

Mindfulness meditation has been incorporated into many workplaces such as in the commercial and government sector. The last decade has seen an increase in research on the benefits of mindfulness, mind-body programs and meditation. More recently, there has been research conducted in evaluating mindfulness training for military personnel, in particular, high stress military deployment (Jha et al, 2015). Mindfulness has been also shown to increase concentration, better outcomes in emotion regulation and increased cognitive skills (Jha et al, 2007). Studies have also shown that mindfulness alleviates anxiety and depression (Hofmann et al. 2010), improves psychological well-being, and enhances stress-management skills (Chiesa et al, 2009). However, mindfulness training for commercial airline pilots have not been evaluated in any great detail, although the effectiveness of this training can have significant benefits.

From the literature review, there is much more work to be done for the benefits of mindfulness in high achieving cohorts such as commercial airline pilots. The following is an outline of the proposed follow-up study to be conducted with a group of commercial airline pilots:

Conduct an 8-12 week mind-body program based upon mindfulness training for commercial airline pilots. Mind-body program will follow the guidelines of the MBSR program (Kabat-Zinn, 1990); the basic structure of a plenary session will consist of 25% theoretical lectures and 75% guided mindfulness training. Theoretical lectures discussed why and how mindfulness could be helpful. Guided practice will consist of mindfulness meditation, including at home personal practice. A control group will also be assessed. The control group will have no intervention for the next 8-12 weeks.

Complete questionnaires before and after intervention. To assess the effectiveness questionnaires such as the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al. 2006). The FFMQ consists of 39 items rated on a 5-point Likert scale, and measures mindfulness on five interrelated subscales: observing, describing, acting with awareness, nonjudgmental responses to inner experience, and non-reactivity to inner experience. This results of the questionnaires will be compared to that of the control group's.

Follow up questionnaires about current experience and operational value of mindfulness training 6, 9 and 12 months after intervention. This results of the 6, 9, 12 month questionnaires will be compared to that of the control group's.

Other considerations:

- Comparison to the intervention group vs. the control group needs to consider external factors that may occur during the 8-12 week period including major life events such as illness, deaths, other tragedies that may affect the person's overall wellbeing and stress levels,
- Consideration of the Hawthorne effect, the observer effect, in which individuals may modify their behaviour in response to being observed.
- Consideration of the placebo effect, the intervention provided in a clinical context may have some placebo effect and this should be noted in the study

The above are just a few examples of the considerations that should be noted when conducting the study, more will be noted as the study progresses.

CONCLUSIONS

This literature review has demonstrated that the implementation of a mindfulness training program could be a feasible and acceptable method for implementation in a commercial aviation environment to help ease stress, increase concentration and assist in mental health risk management. A few potential limitations to mindfulness interventions were uncovered such as the effectiveness of mindfulness for suicidal tendencies, and cultural behaviors in regards to mental health issues in the aviation industry. However, further research is needed as there has been little research conducted on mind-body programs for commercial airline pilots. Recommendations were provided for a follow-up long term study. This literature review thus provides a starting point for implementing and understanding the effects of mindfulness for high achieving cohorts such as commercial airline pilots.

REFERENCES

1. Australian Government Civil Aviation Safety Authority. Designated Aviation Medical Examiner's Handbook. January 2004. Version 3.4.

2. Baer, R.A., Smith, G.T., Hopkins, J., Krietemeyer, J., Toney, L. Using Self-Report Assessment Methods to Explore Facets of Mindfulness. Assessment 2006. 13(1), 27-45.

3. Barnhofer, T., Crane, C., Brennan, K., Duggan, D., Crane, R., Eames, C., Radford, S., Silverton, S., Fennell, M., Williams, J. (2015) Mindfulness-Based Cognitive Therapy (MBCT) Reduces the Association Between Depressive Symptoms and Suicidal Cognitions in Patients With a History of Suicidal Depression. J of Consulting and Clinical Psychology. 83 (6), 1013–1020.

4. BEA Final Report Accident on 24 March 2015 at Prads-Haute-Bléone (Alpes-de-Haute-Provence, France) to the Airbus A320-211 registered D-AIPX operated by Germanwings. BEA. March 2016. BEA2015-2015.EN-LR_03.

5. Carmody, J., Baer, R., Lykins, E., Olendzki, N. An Empirical Study of the Mechanisms of Mindfulness in a Mindfulness-Based Stress Reduction Program. J of Clinical Psychology 2009. 65(6), 613—626.

6. Chiesa A., Alessandro S. Mindfulness-based interventions for chronic pain: a systematic review of the evidence. J of Alternative and Complementary Medicine 2011. 17 (1), 83-93.

7. Cohen S.M., Abujaradeh, H., Safadi, R., Sereika, S.M., Kahle, C.T. Mindfulness-Based Interventions Among Adolescents With Chronic Diseases in Clinical Settings: A Systematic Review. J of Pediatric Health Care 2018. 32(5), 455-472.

8. Collins, K., Best, I., Strizke, W., Page, A. Mindfulness and Zest for Life Buffer the Negative Effects of Experimentally-Induced Perceived Burdensomeness and Thwarted Belongingness: Implications for Theories of Suicide. J of Abnormal Psychology 2016. 125(5), 704–714.

9. Fornette, M.P., Bardel, M.H, Lefrançois C., Fradin, J, Massioui, F.E., Amalberti, R. Cognitive-Adaptation Training for Improving Performance and Stress Management of Air Force Pilots. The International Journal of Aviation Psychology 2012. 22(3), 203–223.

10. Gross, J., Emotion regulation: Affective, cognitive,and social consequences. J of Psychophysiology 2002. 39, 281–291.

11. Hatcher, S. Risk management in mental health: applying lessons from commercial aviation. J of Australasian Psychiatry 2010. 18(1), 4-6.

12. Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. J of Consulting and Clinical Psychology 2010, 78(2), 169-183.

13. Jha, A. P., Krompinger, J., Baime, M. J. Mindfulness training modifies subsystems of attention. J Cognitive, Affective, & Behavioral Neuroscience 2007. 7(2), 109-119

14. Jha, A.P., Morrison, A.B., Best, J.D., Parker, S., Rostrup, N., Stanley, E.A. Minds "At Attention": Mindfulness Training Curbs Attentional Lapses in Military Cohorts. PLoS ONE 2015. 10(2).

15. Kabat-Zinn, J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness. New York: Delacorte. 1990.

16. Klatt, M., Duchemin, A.M., Steinberg, B., Marks, D., Vanover, K. A Small Randomized Pilot Study of a Workplace Mindfulness-Based Intervention for Surgical Intensive Care Unit Personnel. J Occupational and Environmental medicine / American College of Occupational and Environmental Medicine. 2015. 57(4), 393-399.

17. Meland, A., Ishimatsu, K., Pensgaard, A.M., Wagstaff, A., Fonne, V., Garde A.H., Harris, A. Impact of Mindfulness Training on Physiological Measures of Stress and Objective Measures of Attention Control in a Military Helicopter Unit. The International Journal of Aviation Psychology 2016. 25(3–4), 191–208.

18. Nyklíček, I., Mommersteeg, P. M. C., Van Beugen, S., Ramakers, C., & Van Boxtel, G. J. Mindfulness-based stress reduction and physiological activity during acute stress: A randomized controlled trial. Health Psychology 2013, 32(10), 1110-1113.

19. Ravalier, J.M., Wegrzynek, P., Lawton, S. Systematic review: complementary therapies and employee well-being. Occupational Medicine 2016. 66(6), 428-436.

20. Scarpa. P. Mental Health Screening in Aviators-AsMA Recommendations. Aerospace Medical Association. Bucharest. ECAM 2014.

21. Thera, N. The heart of Buddhist meditation. Sri Lanka: Buddhist Publication Society, 1992.

22. Van Der Kolk, B. The Body Keeps Score. New York: Viking. 2014.

23. Wolever R.Q., Bobinet K.J., McCabe K., Mackenzie E.R., Fekete E., Kusnick C.A., Baime M. Effective and viable mind-body stress reduction in the workplace: a randomized controlled trial. J of Occupational Health Psychology 2012. 17(2), 246-258.