

USING YOGA TO REDUCE STUDENTS' ANXIETY

DICKSON, KIRSTY

Dentistry, College of Medical, Veterinary & Life Sciences

ABSTRACT

Yoga has been postulated as a method of reducing anxiety since the practice was born in 3000 BCE, and it has many researched physical and mental benefits, including the ability to practice mindfulness, develop coping mechanisms, and alter the body's stress responses. To see if yoga may help reduce student stress, this study investigated the effect of a six-week yoga course on medical, veterinary and life sciences (MVLS) students, who have long been seen as a high-risk cohort. Analysing Hamilton Anxiety Scales (HAS) scores, used as a clinical measure of anxiety, found a statically significant reduction in students' anxiety levels after each yoga session. Furthermore, all students involved in the study stated they benefitted from being a part of the yoga club and 90% felt yoga reduced their anxiety. These positive effects provide evidence that yoga could be used as an intervention to promote and protect student wellbeing, and this study invites universities to reassess their current approach to mental health and utilise preventative measures to reduce the prevalence of mental health issues.

INTRODUCTION

In 2017, the *Independent* newspaper revealed that 45,000 students in Scotland sought help from counselling services during the preceding five years, with the Universities of Edinburgh and Glasgow having the highest demand (Bussey, 2017). The University of Glasgow contributed 20.7% of these students. The report also identified a single student, from the University of Glasgow, who waited nine months to access services. Recent reports by the *British Broadcasting Corporation* (BBC) further highlighted concerns about the mental wellbeing of students (Hashemi, 2018). It was revealed that the University of Glasgow experienced a 75% rise in students seeking help for their mental health between 2012 and 2017, whilst the University of Edinburgh saw the number of students seeking help double over the same period. These figures highlight the need for support services to safeguard the mental health of students in Higher Education (HE).

The World Health Organisation (WHO) define mental health as 'a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community'. They believe it is an essential component to overall health (WHO, 2004). Anxiety can upset this, and can be short-term/transient, or it may become chronic, with a longer-lasting impact. Chronic anxiety can lead to reduced productivity, increased risk of mental illness, and physical symptoms such as heart palpitations, fatigue, and nausea (Gupta et al., 2014). A systematic review by Albandar et al. (2018) highlighted that the physiological burden of stress can also lead to 'burnout', mood changes, decreased concentration, impaired immune function, loss of appetite, and digestive problems. These effects can cause catastrophising, negative thoughts and difficulty in organising thoughts. Thus, anxiety can have severe repercussions if not properly managed.

Students undertaking courses in the College of Medical, Veterinary and Life Sciences (MVLS) at the University of Glasgow have been found to be at greater risk of poor mental health than the general population: Aboalshamat et al. (2015) found high levels of depression (69.9%), anxiety (66.4%) and stress (70.9%) amongst MVLS students. Dental students have

been shown to use negative coping mechanisms to manage anxiety and stress, including smoking and substance misuse, with social isolation also a danger (Elani et al., 2014). The same authors also reported a link between burnout and depression in dental students which can lead to suicidal ideation. Of particular relevance to clinical courses, Galan et al. (2013) identified that one in ten dental students has experienced suicidal thoughts in the previous year. This highlights the magnitude of mental health and wellbeing issues experienced by students, particularly in MVLS subjects. Higher Education institutions have a responsibility to support, facilitate and implement management strategies to address this topical and pertinent challenge (Barrable et al., 2018). Early interventions and prevention may present a solution to these issues (Stallman, 2010).

A systematic review of stress management strategies for dental students (Alzahem, 2014) highlighted that there is value in discussions focused on coping with stress, time management techniques, improved sleep and diet, physical activity, and stress relievers, like yoga and meditation. Relaxation techniques, including deep breathing and yoga, are recognised as having the ability to reduce stress and/or increase a student's ability to cope (Tripathi, 2018). Yoga decreases sympathetic nerve activity (which is responsible for the 'fight or flight' response) thus leading to muscle relaxation, reduced fatigue, and less perceived stress (Robins, 2012). Yoga can lead to an improvement in emotional sensitivity (Fares, 2016), changing an individual's self-efficacy and increasing their willingness to experience emotions while developing effective skills to regulate them (Robins, 2012). Yoga may also alter thought processes of individuals and reduce cognitive failure due to inattention and absent-mindedness, thus improving academic performance (Malathi, 1999; Fares, 2016). Furthermore, yoga can disrupt the stressed 'mind muscle tension' cycle, which can help regulate natural bodily responses to stress, such as increased blood pressure, pulse and respiratory rates (Fares, 2016). Tul et al. (2011) also found yoga has the ability to bring awareness to the body and empower individuals to understand their own capacity to change their thoughts. This capacity to reframe the mind was found to encourage thoughts and

behaviours that can reduce physical and mental symptoms, including chronic pain.

Yoga might be useful as a prophylactic measure to reduce the current levels of anxiety amongst MVLS students. This project sought to investigate whether a six-week yoga course has any effect on the mental health of MVLS students. The results show the ability of yoga to reduce student anxiety in the run-up to exams. Ultimately, these results aim to inform strategy development and implementation of interventions, including yoga, to improve the mental health and wellbeing of students.

METHODS

Participants

Participants were recruited from students in the College of MVLS at the University of Glasgow, through MVLS email lists, after permission was provided by the respective Heads of Schools. Fifteen individuals were recruited into the project having been enrolled in years two to five of medicine, veterinary medicine, nursing, or dentistry undergraduate courses. An anonymised ID number was assigned to the 15 participants, randomly chosen by the research administrator. The individuals freely provided informed consent and were required to attend six yoga classes at 19:30 on Fridays, commencing in March 2019. To access the facility, a gym membership was required, although participants were required not to have been regularly practicing yoga for the past six months. The College of Medical, Veterinary and Life Sciences Ethics Committee provided approval for this research project.

Data collection

Data was collected over a six-week period, beginning on 22 March 2019 and ending on 26 April 2019. The six yoga classes were performed with the Glasgow University Yoga club: these were 45 minutes long and participants remained completely anonymous, with club members unaware of the study. Before and after each class, participants completed a Hamilton Anxiety Scale (HAS) assessment to gauge their levels of anxiety before and after the yoga intervention. The HAS assessment is used clinically and in research to help understand a patient's / participant's anxiety. It measures fourteen anxiety symptoms, making it a holistic measure (Hamilton, 1959).

At the end of the six weeks of classes, participants also completed a questionnaire: this questionnaire included four five-point Likert scale questions, which ask participants how strongly they agree or disagree with set statements ranging from 'strongly disagree' to 'strongly agree'. Following this is an area of open free text to allow the participants to provide a justification for each response given. Osteras et al. (2008) provided evidence for the use of a five-point scale to allow for internal consistency and discriminative validity. This model was used and adapted in the questionnaire to suit the study aims.

Data analysis HAS scale results

Data was analysed using SPSS statistical analysis software for Windows. Mean values and standard deviations were calculated before a paired *t*-test was carried out, to a significance of 95%. This statistical test deems results to be significant if the *p* value resulting from the test is less than 0.05, with smaller *p* values indicating results were less due to chance. The open ended response was thematically analysed using the Braun and Clarke (2006) method. This allows for codes to be produced from similar themes that appear in the participants results.

RESULTS

HAS scale results

Of the 15 individuals who initially agreed to participate in the study, 11 (73%) completed the HAS for some or all of the six weeks. After the final yoga class, 10 (67%) of the participants completed the questionnaire.

The overall HAS scale scores are detailed in Table 1 and Figure 1 for weeks one through six. These results are out of a possible 56, with a score of <17 indicating mild anxiety, 18-24 indicating moderate anxiety, and 25-30 showing moderate to severe anxiety. Table 1 includes the mean values for before and after each yoga class.

Table 1: Mean HAS score before and after, t-test value and *p* values for weeks one through six

Week	<i>M</i> _{before}	<i>M</i> _{after}	<i>t</i> -test value	<i>p</i> value
One	18.7**	7.5*	7.01	<0.05
Two	15.2*	5.36*	8.91	<0.05
Three	14.9*	6.2*	5.34	<0.05
Four	12.2*	4.1*	7.8	<0.05
Five	10.6*	2.9*	7.8	<0.05
Six	13.5*	2.9*	5.9	<0.05

Level of anxiety key: * = mild; ** = moderate; *** = severe

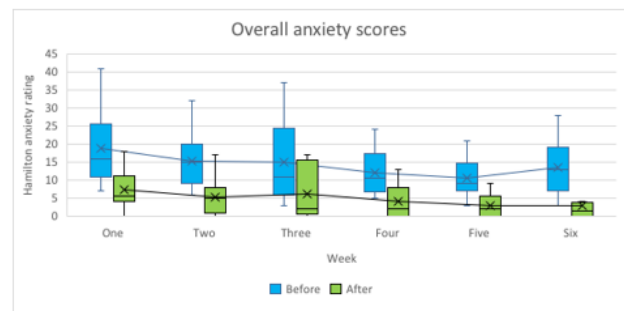


Figure 1: Overall anxiety scores before and after each class, over the six weeks

Statistical analysis

Table 2 details the breakdown of each of the 14 sections of the HAS results. It formulates an average (mean) value before and after each class for each subsection. Each subsection sees a reduction in mean value after yoga classes, with all results decreasing by over 50%. The greatest reductions were seen in fears, somatic (sensory), tension, and anxious mood.

Table 2: Mean values before and after each class for each of the 14 subsections of the HAS

Variable	<i>M</i> _{before}	<i>M</i> _{after}	% reduction
Anxious Mood	1.48	0.43	70.9
Tension	1.55	0.38	75.5
Insomnia	1.50	0.57	62.0
Fears	0.80	0.16	80.0
Intellectual	1.52	0.75	50.6
Depressed mood	1.45	0.50	65.5
Somatic (muscular)	0.90	0.32	64.4
Somatic (sensory)	0.57	0.14	75.4
Cardiovascular	0.80	0.34	57.5
Respiratory	0.80	0.39	51.3
Gastrointestinal	1.04	0.39	62.5
Genitourinary	0.50	0.26	48.0
Autonomic	0.86	0.38	55.8
Behaviour at interview	0.82	0.32	61.0

The difference between the mean before and after scores was analysed using a t-test. To understand whether results are significant, a *p* value is determined; the lower the *p* value of results, the less likely the results happened by chance and more likely due to the investigated intervention. If the *p* value is less than 0.05, it is said that the results are significant with 95% confidence, the most commonly utilised confidence interval in medical research (Akobeng, 2008).

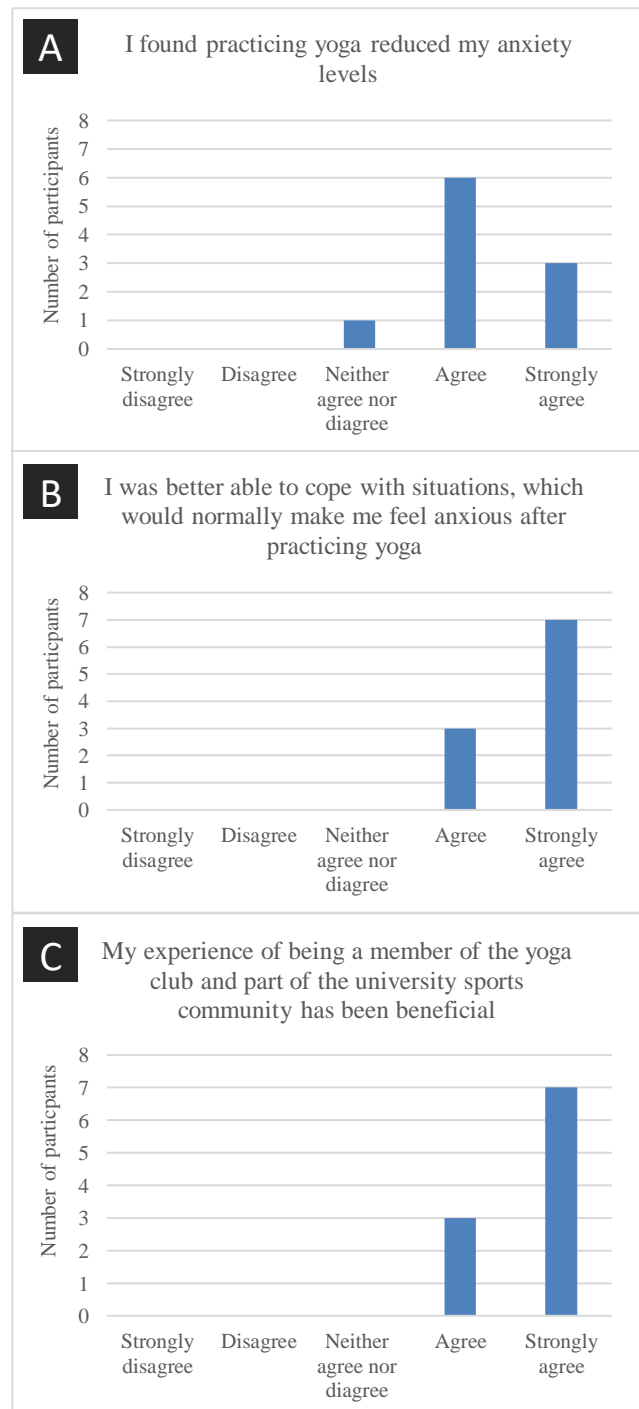
The results show that participants had reduced HAS scores after each of the six weeks of the yoga class. For each week of the course, mean HAS scores of students reduced by 66.3%, on average, from before to after each class.

A repeated measure t-test found that each of the differences are significant as the *p* value was ≤ 0.05 . This result demonstrates that yoga can reduce MVLS student's anxiety.

Likert scale results

The first part of the study included Likert scale questions which ask the participant to judge how far they agree with a statement. When asked if yoga reduced their anxiety levels, 10% neither agreed nor disagreed, 60% agreed and 30% strongly agreed. These results are detailed in Figure 2 (Panel A).

When asked if practicing yoga made them better able to cope with situations which would normally make them feel anxious, 50% neither agree or disagree, 40% agreed and 10% strongly agreed (Figure 2, Panel B).

**Figure 2: 'To what extent do you agree with the following phrase?'**

When asked if their experience of being a member of the yoga club and part of the sports community was beneficial, 30% agreed and 70% strongly agreed (Figure 2, Panel C).

Thematic Analysis

Results of the thematic analysis highlighted the positive view participants had on the ability of yoga to reduce anxiety, and the benefit of being part of a sports club. It also elucidated a few drawbacks to yoga and its implementation, including the difficulty level of the class, expense, and time. The participants also highlighted the physical, mental and behavioural aspects of yoga they felt were of benefit. These results support the HAS scores, providing further confidence in the quantitative data and supplying a deeper understanding of yoga's positive effects on anxiety levels.

The codes gained from analysis of the qualitative data allowed for the production of themes: the four themes produced were ‘barriers’, ‘physical wellbeing’, ‘mental wellbeing’ and ‘daily behaviour’. Each theme was then explored within the supporting qualitative data and relevant scientific studies.

Figures 3-6 display the codes for each theme and their frequency.

Barriers

Participants highlighted a limitation to the practice of yoga being the difficulty of the class. For example, participant 8 stated that: ‘I am a very inactive person and so I did struggle a lot at the beginning’.

Forty percent of participants also stated cost to be an issue when asked the limitations of yoga, with one participant stating: ‘It can be inaccessible to people due to income’.

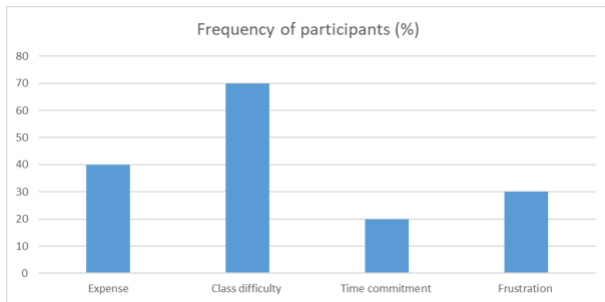


Figure 3: Frequency of reported barriers

Physical wellbeing

Several of the participants saw exercise as a benefit of practicing yoga, with one participant (15) stating ‘it was nice to move when all you do is sit and study.’

This participant highlights the culture amongst many hard-working MVLS students, who often tend to prioritise studying over physical exercise and socialisation around exams. Participant 15 further stated ‘[it] reminded me how much more there is to life than just school and stress; showed me the importance of taking breaks and doing things beyond school’.

Many also highlighted the beneficial effect of reduced muscle tension. One participant stated that yoga ‘released muscle tension and soreness from long hours of sitting down’.

Other commonly recurring codes were for strength and flexibility, with one participant stating ‘it increased body strength and stamina over the weeks’.

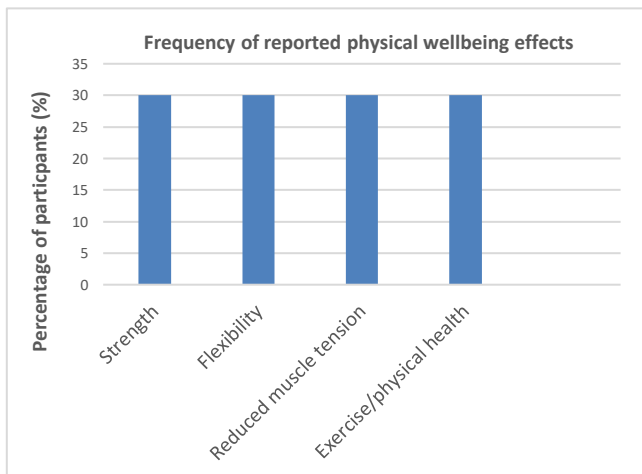


Figure 4: Frequency of reported physical wellbeing effects

Mental wellbeing

Participants alluded to the many psychological benefits of yoga. A recurring code was the evolution of mindfulness that came from practicing yoga. Participant 10 found they were able to ‘stay focused and slow down their thoughts’.

Participant 8 found they were ‘able to focus more and listen to what is being said during ward rounds’.

Participants identified taking a mental break as being helpful, with participant 13 stating it allowed them to ‘take time to clear my mind, not worrying about external factors’. Several other participants drew benefit from reduced anxiety and tension. Participant 13 said ‘I sometimes feel anxious on public transport, but I always felt calm after doing yoga’ and ‘I found I could concentrate more’. Participant 2 stated ‘I was considerably less stressed out about exams’. This was further explored by participant 10 who found yoga ‘allowed me to reflect, understand and manage my anxiety. It helped me remain calm in a difficult situation’.

Participants also benefited in terms of self-care. Participant 13 stated ‘I got to know my body, learning to care for my body and not strain it’.

The broad range of mental wellbeing benefits reported by the participants are presented in Figure 5.

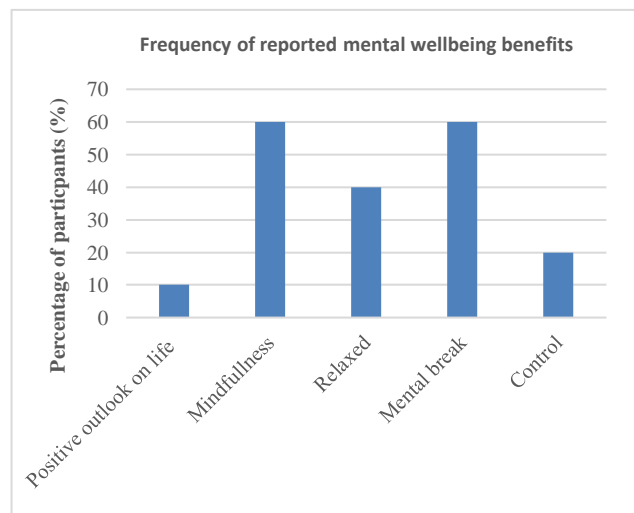


Figure 5: Frequency of reported mental wellbeing benefits

Daily behaviour

80% of participants found improvement in their sleeping habits. The supporting qualitative data includes participant 8 reporting ‘it has enabled me to try and shut down my mind at night before sleep’.

Another code that emerged was the benefits of yoga on work-life balance, with participant 14 stating it was a ‘good way to meet like-minded people’.

Participants found that the breathing exercises and mindfulness techniques gained from yoga helped to address anxiety, with participant 8 stating it ‘trained my mind to focus more easily through the exercises, coupled with coordinating breathing’.

Meanwhile, participant 10 said ‘[yoga has] given me a coping strategy for anxiety with longer term effects’.

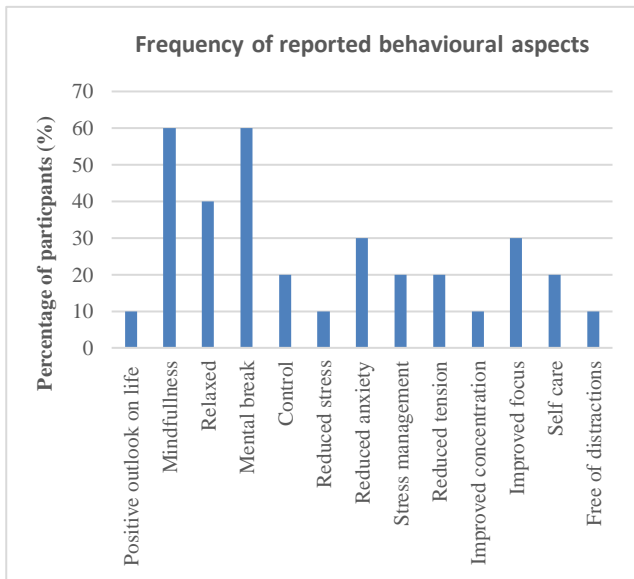


Figure 6: Frequency of reported behavioural aspects

Current Mental Wellbeing Support

Seventy percent of participants felt the current mental health support system at the university was poor or inadequate. Participant 8 highlighted that ‘as far as I know, everyone on my course struggles with high levels of stress’.

This was felt by several others, with participant 15 stating ‘the service had limitations’ and a ‘huge lack of support’.

Participants also believed that an increase in preventative measures towards mental health would be beneficial. All candidates asked agreed there is a need for increased measures, with four participants writing ‘Definitely’.

When asked how the university could help students, 60% responded by explicitly requesting accessibility to yoga. Participant 5 stated: ‘It is a skill I’d choose to continue’.

Others felt academic members of staff could help, with participant 1 requesting ‘[e]ncouraging educational supervisors to ask students about life in general - rather than just focusing on the academic aspect’.

DISCUSSION

The overall quantitative results from the HAS scores show that the intervention of yoga had a positive impact on many aspects of MVLS student anxiety, which are statistically significant. This echoes similar findings from Gururaja et al. (2011), who assessed immediate anxiety reduction before and after yoga classes, and long-term anxiety reduction through state anxiety scores. They found a significant reduction in both of these testing measures, indicating that yoga had a positive effect on both immediate and long-term mental health.

Results of the studies questionnaire showed 90% agreed with the statement ‘I found practicing yoga reduced my anxiety levels’, which supports results from the HAS assessments. The questionnaire also found participants agreed that the overall experience of the club was beneficial: all agreed, with 70% strongly agreeing.

The questionnaire also highlighted difficulty of the class as a barrier to yoga. This finding agrees with Quilty et al. (2013), who found that one of the greatest barriers to yoga was the

difficulty of classes. However, to meet the study criteria, an individual should not have regularly practiced yoga for the past six months, which limited the study to those who were not used to the movements involved and were more likely to have initial difficulties. Quilty et al. (2013) also highlighted expense as a factor that acts as a barrier to yoga practice. This aligns with the findings of the present study, where 40% of participants stated cost was an issue in the questionnaire.

The HAS results for tension scores reduced by 75.5%, which is reinforced by participants highlighting yoga’s ability to ‘reduce muscle tension’ and provide a ‘mental break’ in the questionnaire. A systematic review by Kirkwood et al. (2005) found yoga to be the only exercise (of the forms studied) to have this immediate effect on anxiety. This is especially pertinent for MVLS students as, due to the nature of studying and clinical activities, muscle pain and tightness can evolve (Gaowgzeh et al., 2015). The results found a 64.5% reduction for the somatic section of the HAS scores, which equates to muscular pain, suggesting yoga could be a particularly helpful intervention

The questionnaire revealed that participants enjoyed the exercise they gained through yoga. This is an important result, as many current studies have found a link between physical exercise and reduced stress. Koschel et al. (2017) found a reduction in stress levels of students with the implementation of an exercise programme. The present study therefore supports exercise as a benefit gained through yoga and an important aspect of its stress-reducing mechanism.

HAS results on insomnia showed a 62% reduction in the mean value before class compared to after. The qualitative findings align with this, as 80% of participants reported an improvement in their sleeping patterns in the questionnaire. Woodyard (2011) supports this finding, stating that yoga results in inhibition of the sympathetic area of the hypothalamus. This area of the brain helps regulate the body’s autonomic fight-or-flight reflex, and thus increases an individual’s ability to cope with anxiety. This reduction in the stimulation of the nervous system is responsible for yoga’s ability to improve the participants sleep.

The HAS section reporting depressed mood saw a 65.5% decrease in mean values. This is reflected in the qualitative data under the theme of mental wellbeing. The codes produced from the questionnaire include mindfulness, control, and self-care. Cho et al. (2016) found that yoga’s ability to increase positive automatic thoughts also reduced test anxiety. This could explain why the HAS score revealed a 70.9% reduction in anxious mood alongside a 50.7% reduction in the intellectual HAS (meaning improved ability). In the questionnaire, individuals reinforced these findings by stating yoga improved their concentration, focus, and clinical ability. A study by Domes et al. (2004) found that chemicals secreted due to stress lead to memory retrieval impairment. This suggests that failure to suppress anxiety can lead to failures in cognition, and may affect clinical performance. As there is a great deal of literature to support the link between stress and reduced academic performance (Elias et al., 2011), yoga’s ability to reduce stress could be a valuable means of improving academic performance.

When questioned on their involvement with the yoga club and the University of Glasgow Sports Association (GUSA), all participants said they benefitted, with 70% strongly agreeing. Eime et al. (2013) found a similar association between participation in sports and mental health, highlighting the potential social and physiological benefits to the student. The results encourage the use of physical activity to enhance psychological and social health outcomes. This is helpful to understand the best approach to managing mental wellbeing

among students and indicates the need for greater investment in the inclusion of exercise for student health and wellbeing.

The thematic analysis found that students reported the study showed they were prioritising studying over their physical and mental wellbeing. This is a very topical issue addressed by Cho et al. (2018), who explains the prevalence of burnout and tendency for medical students to fall into an exhaustive study routine. The report highlighted the disadvantages of this state on not only their academic performance, but also their physical and mental wellbeing. Thus, the positive effect yoga had on the participants' work-life balance suggests a further means of improving mental wellbeing. In the questionnaire, half of the participants said yoga helped them cope with situations that normally made them feel anxious. These results allude to those found by Saoji (2016), reinforcing the importance of developing coping mechanisms through yoga practice.

The ability of yoga to enhance self-awareness, care, and compassion has been documented in previous research (Cocchiara et al., 2019). This project supports these findings, as the questionnaire revealed that yoga enhanced the participants' awareness of their bodies and increased their ability to address their feelings.

In the questionnaire, participants reported mindfulness as a benefit on their mental health and academic performance. Mindfulness allows students to reframe their thoughts to be involved solely in the present. This creates a sense of calm by reducing other worrying thoughts that are uncontrollable or which they cannot solve at that moment in time (Keng et al. 2011). A systematic review supports the results from the current study, finding that mindfulness significantly reduced anxiety amongst university students (Galante et al. 2016).

Breathing exercises, used as mindfulness techniques, were praised by the participants in the questionnaire. This reflects findings by Cho et al. (2016), who found daily mindful breathing increases positive automatic thoughts, which in turn saw a reduction in test anxiety. This suggests that mindfulness and breathing techniques gained by practicing yoga can aid students in anxiety control.

Limitations of the Study

As this was a pilot study, only a small cohort was utilised, which limits the ability to find significant relationships in data. Consequently, the small sample size limits the potential for the study sample to comprehensively represent the MVLS student population. However, qualitative data findings suggest that this smaller sample size may be sufficiently representative, due to the repetition of codes and patterns (Boddy, 2016).

As this research project took place in the run-up to the end of the year, it was also hard to gain results from all the participants over the six weeks, and those who sought to participate are most

likely actively involved and interested in managing their mental wellbeing. This can result in lower starting anxiety levels, which leads to greater difficulty in interpreting significant results.

The HAS scale chosen may also limit results, as participants often present with different perceptions and self-awareness of their own anxiety symptoms.

Potential for future research

Further studies into this topic could be undertaken on a larger scale to obtain data from a greater cohort and thus allow for a more representative result for students in HE. Students could also be subject to more frequent yoga sessions and for a greater duration to allow anxiety-reducing techniques to be acquired. To allow for researcher access to participants, and ensuring equal opportunity, the study should not require a gym membership.

To ensure gold standard, a randomised, controlled trial should be utilised in future investigations, with the creation of a control group and an intervention group, ensuring the only variable to change is the practice of yoga.

Further research could also explore how yoga and anxiety influence clinical and academic ability. This could evaluate participants' overall university experiences, development of social and work life balance, and the presence of anxiety related symptoms (for example, sleep).

CONCLUSION

The current study found that anxiety, and many of its symptoms, can be reduced by practicing yoga. The quantitative results concluded that there was a statistical significance in the reduction of anxiety for each of the six weeks when the overall anxiety score was analysed before and after each yoga class. These results are supported by the questionnaire, which identified many aspects of yoga that aided this reduction in anxiety and improvement in wellbeing and intellectual ability.

This is a pilot study, and further research into the affected aspects of anxiety and their mechanisms should be performed on a greater scale to understand how impactful the intervention could be. This study, therefore, invites HE to reassess its current approach to mental health, encouraging greater support to aid the prevention of mental health issues instead of focusing on treating these issues when they arise.

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